ORDER NO. HAD8602345C8

Service Manual

Receiver

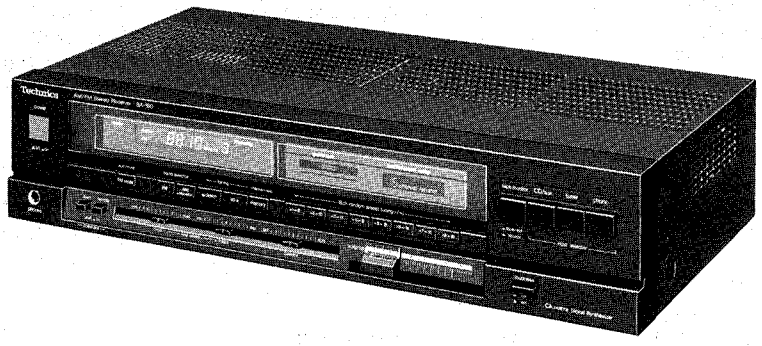
QUARTZ Synthesizer
AM/FM Stereo Receiver

QUARTZ Synthesizer
LW/MW/FM Stereo Receiver

SA-190
SA-190L

Color

(K)...Black Type



* This photo is SA-190.

Color	Areas
(K)	[EX]....Continental Europe. (SA-190)
(K)	[EH] ...Holland. (SA-190)
(K)	[XL]....Australia. (SA-190)
(K)	[XA]....Asia, Latin America, Africa, Middle Near East and Oceania. (SA-190)
(K)	[EF]....France. (SA-190L)
(K)	[EB]....Belgium. (SA-190L)
(K)	[EK]....United Kingdom. (SA-190L)
(K)	[EW]...Switzerland. (SA-190L)

SPECIFICATIONS

(DIN 45 500)

■ AMPLIFIER SECTION

1 kHz continuous power output	
both channels driven	2 × 35W (8Ω)
Total harmonic distortion	
half power at 1 kHz	0.07% (8Ω)
Intermodulation distortion	
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.5%
Power bandwidth	
both channels driven, −3 dB	10 Hz~40 kHz (8Ω)
Damping factor	20 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
CD/AUX, TAPE/EXT	150 mV/22kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power (8Ω)	
PHONO	70 dB (IHF, A: 72 dB)
CD/AUX, TAPE/EXT	88 dB (IHF, A: 95 dB)
Frequency response	
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
CD/AUX, TAPE/EXT	10 Hz~70 kHz (−3 dB)
Tone controls	
BASS	50 Hz, +10 dB~−10 dB
TREBLE	20 kHz, +10 dB~−10 dB
Loudness control (volume at −30 dB)	50 Hz, +9 dB
Output voltage	
REC OUT	150 mV
Channel balance, 250 Hz~6,300 Hz	±1 dB
Channel separation, 1 kHz	55 dB
Headphones output level and impedance	390 mV/330Ω
Load impedance	
MAIN or REMOTE	8Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz
Sensitivity	
S/N 30 dB	1.5 μV (75Ω)
S/N 26 dB	1.3 μV (75Ω)
S/N 20 dB	1.2 μV (75Ω)
IHF usable sensitivity	1.5 μV (IHF '58, 75Ω)
IHF 46 dB stereo quieting sensitivity	22 μV/75Ω
Total harmonic distortion	
MONO	0.15%
STEREO	0.3%
S/N	
MONO	60 dB (75 dB, IHF)
STEREO	58 dB (71 dB, IHF)
Frequency response	20 Hz~15 kHz, +1 dB~−2 dB
Alternate channel selectivity	±400 kHz, 65 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	40 dB
IF rejection at 98 MHz	70 dB

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Spurious response rejection at 98 MHz	70 dB
AM suppression	50 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	−30 dB (−35 dB, IHF)
38 kHz	−45 dB (−50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μV
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	75Ω (unbalanced)

■ AM TUNER SECTION (SA-190)

Frequency range	522~1611 kHz (9 kHz-step) 530~1620 kHz (10 kHz-step)
Sensitivity (S/N 20 dB)	20 μV, 330 μV/m
Selectivity	55 dB
Image rejection at 999 kHz	40 dB
IF rejection at 999 kHz	55 dB

■ AM TUNER SECTION (SA-190L)

Frequency range	
MW	522~1611 kHz (9 kHz-step) 530~1620 kHz (10 kHz-step)
LW	155~353 kHz (153~351 kHz, −2 kHz shift)
Sensitivity (S/N 20 dB)	
MW	20 μV, 330 μV/m
LW	45 μV
Selectivity	
MW (at 999 kHz)	55 dB
LW (at 254 kHz)	55 dB
Image rejection	
MW (at 999 kHz)	40 dB
LW (at 254 kHz)	40 dB
IF rejection	
MW (at 999 kHz)	55 dB
LW (at 254 kHz)	40 dB

■ GENERAL

Power consumption	200W
Power supply	
For United Kingdom and Australia	AC 50 Hz/60 Hz, 240V
For continental Europe	AC 50 Hz/60 Hz, 220V
For others	AC 50 Hz/60 Hz, 110V/127V/220V/240V
Dimensions (W×H×D)	430 × 97 × 243 mm (16-15/16" × 3-13/16" × 9-9/16")
Weight	4.5 kg (9.9 lb.)

(Specifications are subject to change without notice for further improvement.) (Weights and dimensions shown are approximate.)

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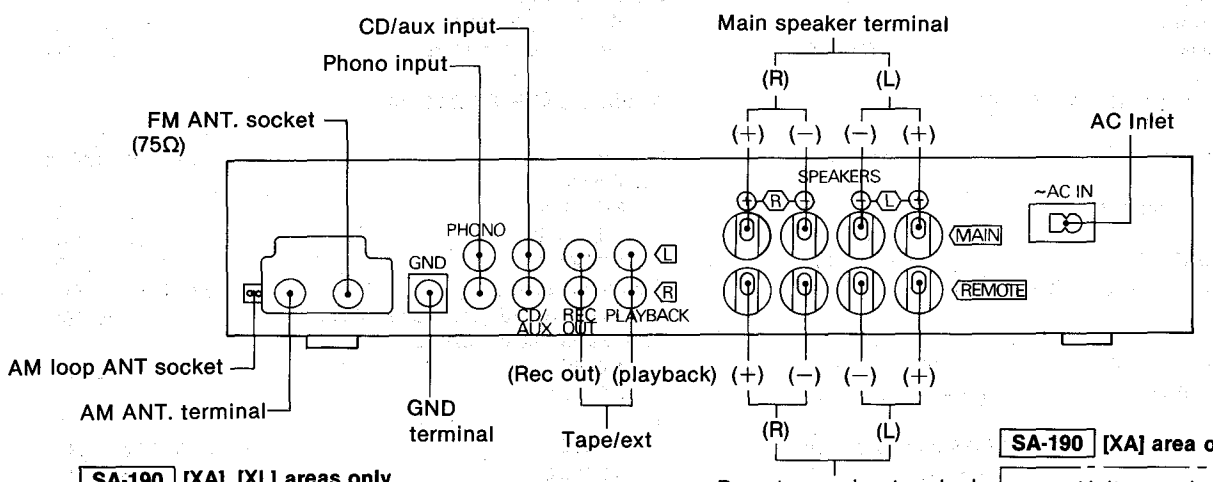
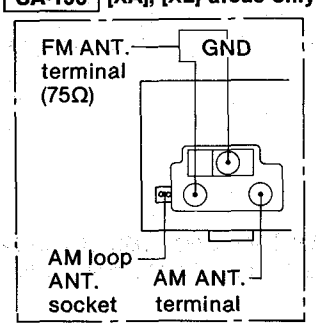
■ LOCATION OF CONTROLS

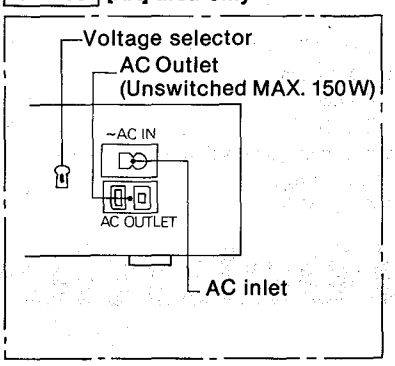
- **Rear panel (SA-190L, SA-190)**



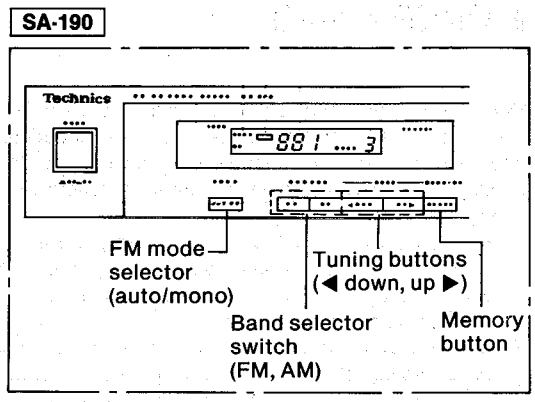
SA-190 [XA], [XL] areas only

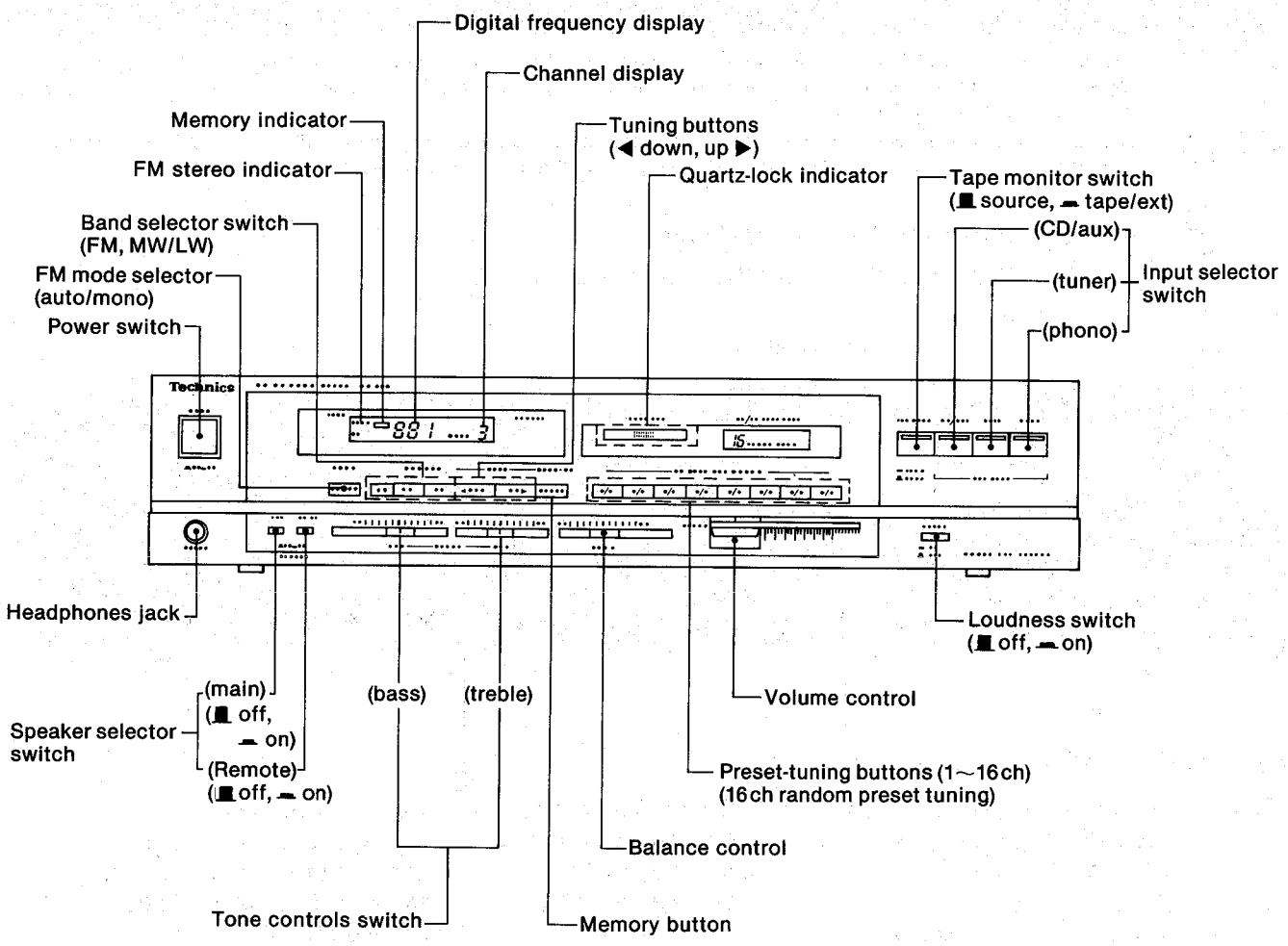


SA-190 [XA] area only



- **Front panel (SA-190L)**





- The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different. So, refer to the circuit diagram and the replacement parts list.

*220V (50/60Hz) for continental Europe.

*240V (50/60Hz) for United Kingdom [EK] area and Australia [XL] area.

* 110V/127V/220V/240V (50/60Hz) for [XA] area (For [XA] area is provided with voltage selector)

- Phono input capacitance is about 150pF.

■ OPERATING

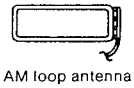
The indication AM used here includes both MW and LW for Model SA-190L.

With this unit you may preset as many as 16 radio broadcast stations: FM/AM random presetting. After broadcast stations have been preset as described below, any desired station can be quickly and easily selected by simply touching one button.

Notes:

1. For automatic presetting in areas where there are less than 16 FM stations, the remaining channels (through channel 16) will be left empty. The empty channels can be filled by using manual memory presetting.
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased. Then reset the memory.
3. For AM broadcasts with extremely strong signal transmissions, the frequency memorized may be slightly off of the correct frequency. If this occurs, use the manual control to memorize.

Important!



AM loop antenna

If this antenna is not installed, AM broadcasts will not be received.

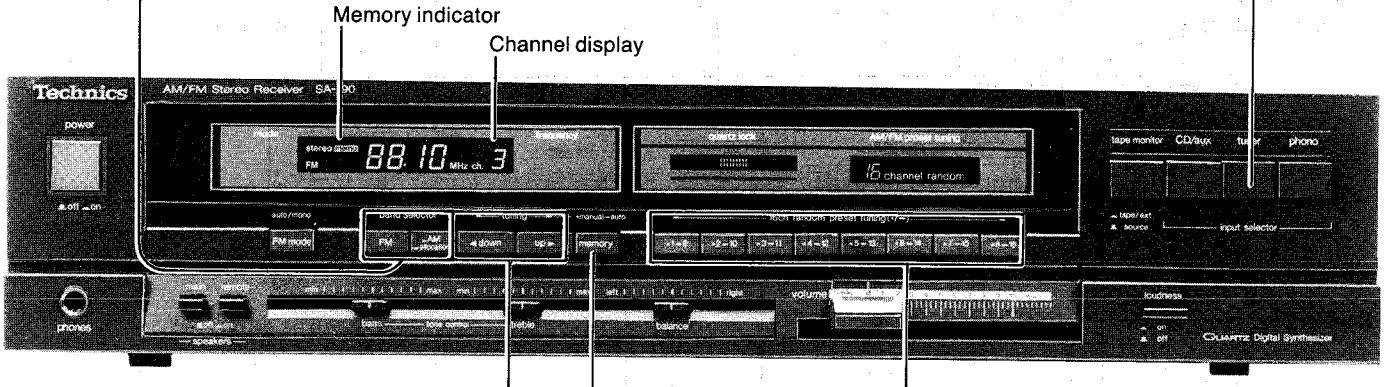
Automatic memory presetting

SA-190 The FM broadcasting stations and AM broadcasting stations will be automatically preset to "channels" 1 through 16 for FM and 9 through 16 for AM, respectively. When AM is automatically preset, the FM stations on "channels" 9 through 16 will be replaced by the new AM stations.

SA-190L The FM broadcasting stations, MW broadcasting stations, and LW broadcasting stations will be automatically preset in "channels" 1 through 16 for FM, 9 through 16 for MW, and 13 through 16 for LW, respectively.

2 **SA-190** **Press the "FM" or "AM" button.**
SA-190L **Press the "FM", "MW" or "LW" button.**

1 **"tuner" (■→▲)**

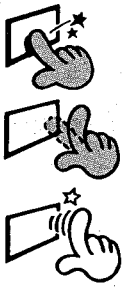


3 **Set to the lowest frequency.**

SA-190
- **FM: 87.50 MHz** (0.05 MHz step)
- **AM: 522 kHz** (9 kHz step) **or 530 kHz** (10 kHz step)

SA-190L
- **FM: 87.50 MHz**
- **MW: 522 kHz** (9 kHz step) **or 530 kHz** (10 kHz step)
- **LW: 155 kHz** (9 kHz steps) **or 153 kHz** (9 kHz steps: −2 kHz shift)

① Press the button and hold slightly (frequency will change continuously).
② Release it when approaching the above exact frequency, and then press the button again momentarily (frequency change will stop).
③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.



4 **Press. When the frequency indication begins to change, release.**

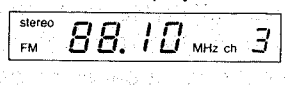
The frequency will change upward, and the automatic presetting will begin with the next broadcasting station. It will continue to preset the following consecutive broadcast stations.

5 **Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel, and enter them on the file sheet**

To check the front channels (CH 1~ 8):

Press momentarily.

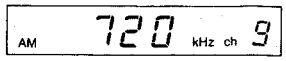
Frequency stored in the memory and channel number are displayed.



To check the back channels (CH 9~ 16):

Press slightly longer.

Frequency stored in the memory and channel number are displayed.



■ "Most-recent" memory

The most-recent memory is a system by which the unit "remembers" the FM or AM broadcast station last heard when this unit is turned off, and automatically tunes to that station the next time the power is turned on.

■ "Back-up" memory

This is the function which preserves the preset memory and most-recent memory functions. In the event of a power failure, or if the power cord of the tuner is disconnected from the electric outlet, the back-up memory will preserve the preset memory and most-recent memory functions for as long as approximately one week.

■ To Prevent Erasing the memory

If the power supply is interrupted for one week or longer, the memory settings will be erased.
For example:
1) If the power cord is disconnected from the electric outlet,
2) If an audio timer is used and the timer does not operate the tuner for a week or longer,
3) If a power failure occurs, etc.

If any of the above occurs, the memory will have to be reset. The memory in this unit is maintained by a gold capacitor. If the power supply is interrupted for a week or longer, set the power switch of the tuner to the "on" position for thirty minutes or more in order to recharge the gold capacitor. Then reprogram the memory.

Manual memory presetting

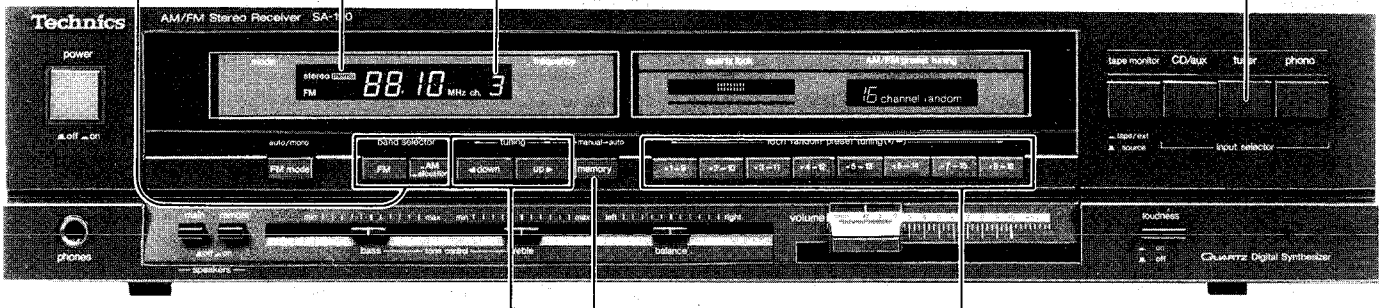
Stations can be freely preset to any desired channel.

2 (SA-190) **Press the "FM" or "AM" button.**
(SA-190L) **Press the "FM", "MW" or "LW" button.**

1 **"tuner" (■→■)**

Memory indicator

Channel display



3 **Press the appropriate tuning button to tune to the desired broadcast.**

- **Automatic tuning**
  Press the button. When the frequency indication begins to change, release the button (a broadcasting station will be selected automatically).
  Repeat this operation until the desired station is found.

- **Manual tuning**
  Press the button momentarily and tune to the desired station.
  The frequency will change each time the button is pressed.

4 **Press momentarily, and then release.**

(The memory indicator will illuminate for about 4 seconds.)

If the button is pressed continuously, the frequency will begin to change, and the memory will be preset automatically.
To stop the automatic memory presetting, once again press either the "up" button or the "down" button.

5 **While the memory indicator is illuminated, press the button of the desired channel.**

- **To preset channels 1 through 8:**
  Press the button momentarily, and then release. (Preset channel number is displayed on the channel display.)

- **To preset channels 9 through 16:**
  Press the button slightly longer, and then release.

Notes:
If the memory indication illumination stops before you press the button, once again repeat step 4 and then step 5.

6 **Enter the name (call sign, etc.) of the preset broadcasting station on the station memory file sheet.**

This completes the procedures for presetting radio broadcast frequencies. The other preset-tuning buttons can be preset in the same way by following steps 2 through 6.

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of the amplifier are used.

If this occurs, follow the procedure outlined below.

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again.

Note:
When the protection circuitry functions, the unit will not operated unless the power is first turned off and then on again.

■ BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power, Discharge both power supply capacitors (C703, C704 8200μF) through a 10Ω 5W resistor to ground. Do not short between C703 and C704. It may damage the capacitors.
2. After completion of repair, slowly apply the primary voltage by using a variac to avoid over current. Current consumption at 50Hz/60Hz in no signal mode should by shown with respect to supply voltage 110V/127V/220V/240V.

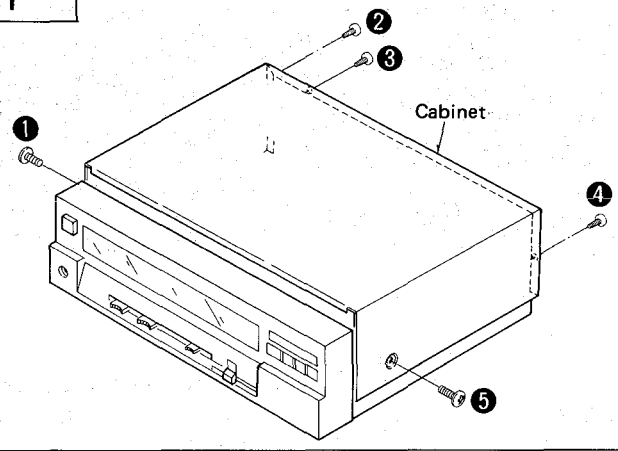
Power supply voltage		110V	127V	220V	240V
Consumed current	50/60Hz	160~410mA	150~400mA	60~210mA	50~200mA

■ DISASSEMBLY INSTRUCTION

Ref. No. 1 — **How to remove the cabinet**

Procedure 1

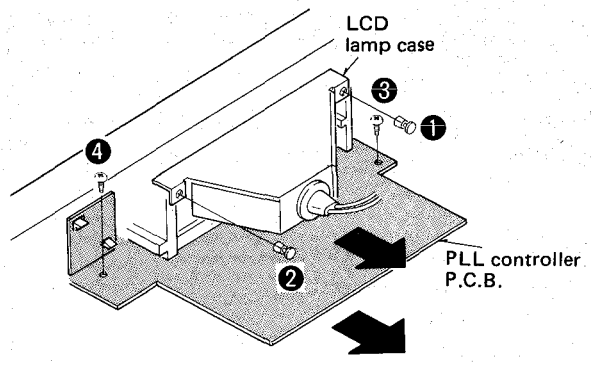
1. Remove the 5 screws (❶ ~ ❺).



Ref. No. 3 — **How to remove the PLL controller P.C.B.**

Procedure 1➡3

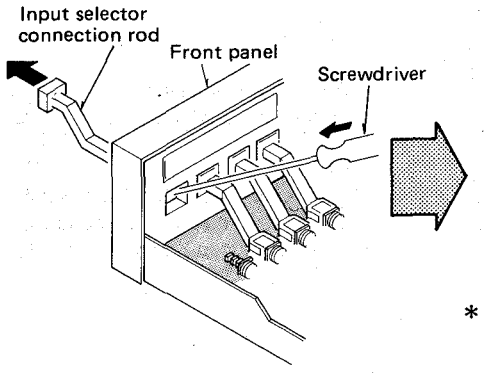
1. Remove the 2 latch (❶, ❷) of LCD lamp case.
2. Remove the 2 screws (❸, ❹) of PLL controller P.C.B.



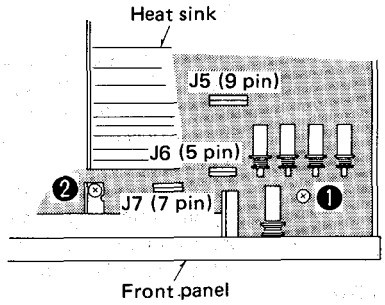
Ref. No. 2 — **How to remove the front panel**

Procedure 1➡2

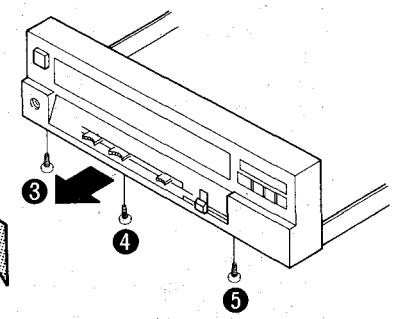
1. Remove the 5 connection rods.



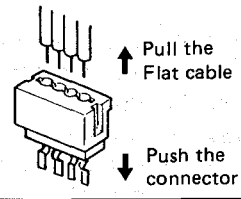
2. Remove the 2 screws (❶, ❷).
3. Pull the 3 connection (J5, J6, J7).



4. Remove the 3 screws (❸ ~ ❺)

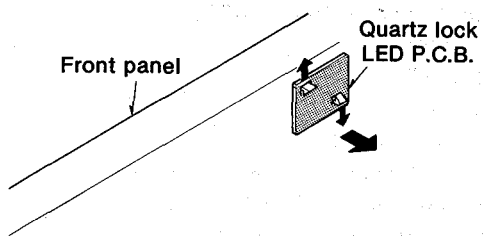


How to remove Flat cable

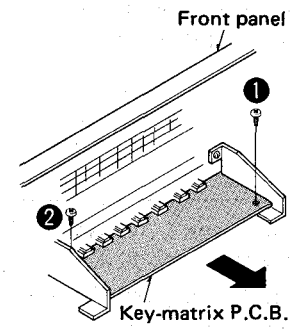


* Please pay attention when the front panel is remounted in order to prevent damage the grounding isolation foil of FL display to the plastic support behind the TREBLE control.

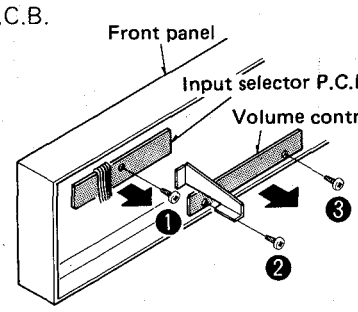
Ref. No. 4	How to remove the quartz lock LED P.C.B.
Procedure 1➡2➡4	1. Remove the 2 tabs of quartz lock LED P.C.B.

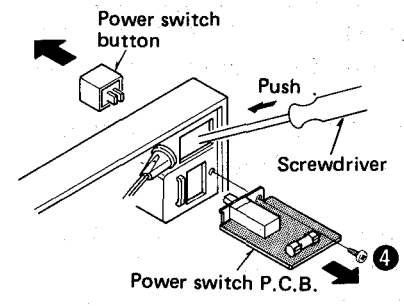


Ref. No. 5	How to remove the key-matrix P.C.B.
Procedure 1➡2➡5	1. Remove the 2 screws (❶, ❷) of key-matrix P.C.B.

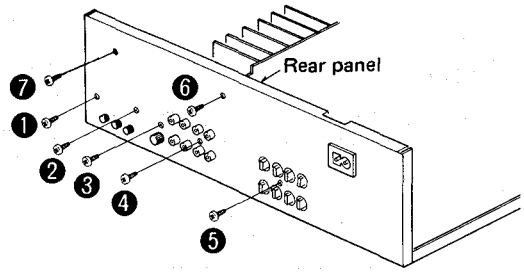


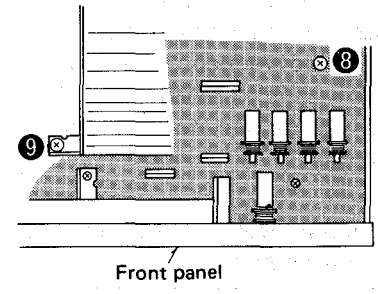
Ref. No. 6	How to remove the input selector P.C.B., volume control P.C.B. and power switch P.C.B.
Procedure 1➡2➡6	1. Remove the screws (❶) of input selector P.C.B. 2. Remove the 2 screws (❷, ❸) of volume control P.C.B. 3. Remove the power switch button and screw (❹) of power switch P.C.B.

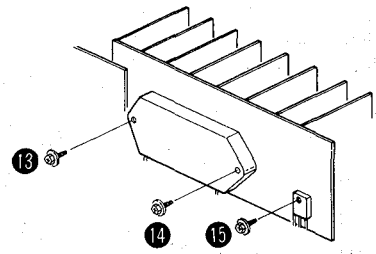


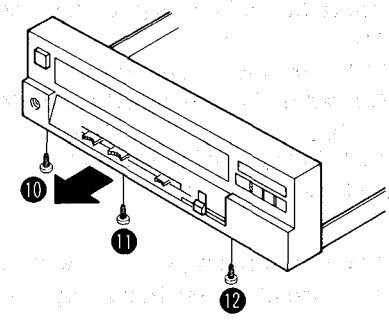


Ref. No. 7	How to remove the power IC and regulator transistor
Procedure 1➡7	1. Remove the 7 screws (❶ ~ ❼) of rear panel. 2. Remove the 2 screws (❽, ❾) of main P.C.B. 3. Remove the 3 screws (❿ ~ ⓬) of front panel. 4. Unsolder the power IC or regulator transistor. 5. Remove the 3 screws (⓭ ~ ⓯).









- When mounting the Power IC.
  IC apply silicone compond (SZZ0L15) to the rear side of Power IC.

■ MEASUREMENTS AND ADJUSTMENTS

AM/FM (SA-190)
LW/MW/FM (SA-190L)

Control positions and equipment used

- AM and FM signal generator (AM and FM-SG)
- Stereo modulator
- Distortion analyser
- Oscilloscope
- AC and DC electronic voltmeter (EVM)
- Frequency counter
- Choke coil (100μH)
- Resistor (100kΩ)
- Ceramic capacitor (200pF)

Note: For **T201** (AM-IFT) and **L205** (AM OSC coil), adjusted parts are supplied. (SA-190)
For **L204** (LW-IFT) and **L205** (MW OSC coil), adjusted parts are supplied. (SA-190L)
So, do not turn the cores of these parts.

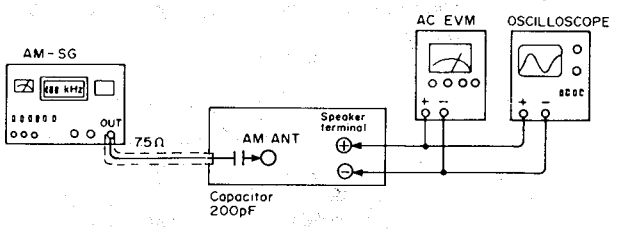
AM (MW)-RF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "**AM (MW)**" position.
3. Place the radio dial and signal generator setting to **610kHz**.
4. Adjust **L204** for maximum output. **(SA-190)**
4. Adjust **L203** for maximum output. **(SA-190L)**
5. Place the radio dial and signal generator setting to **1500kHz**.
6. Adjust **CT201** for maximum output.
7. Repeat steps 3.~6.

Note:

Antenna input level must be as low as possible being free from AGC.

AM SIGNAL GENERATOR CONDITION
Modulation 30%
Modulation frequency..... 400 Hz



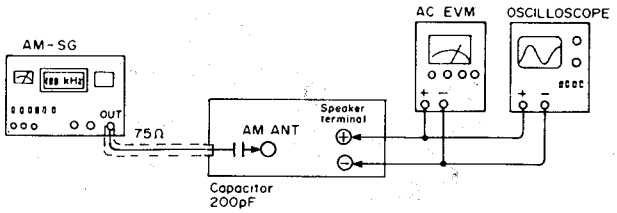
LW-RF ADJUSTMENT (SA-190L only)

1. Test equipment connection is shown in figure.
2. Set the unit to "**LW**" position.
3. Place the radio frequency display and signal generator setting to **155kHz**.
4. Adjust **L206** for maximum output.
5. Place the radio frequency display and signal generator setting to **353kHz**.
6. Adjust **CT202** for maximum output.
7. Repeat steps 3.~6.

Note:

Antenna input level must be as low as possible being free from AGC.

AM SIGNAL GENERATOR CONDITION
Modulation 30%
Modulation frequency..... 400 Hz



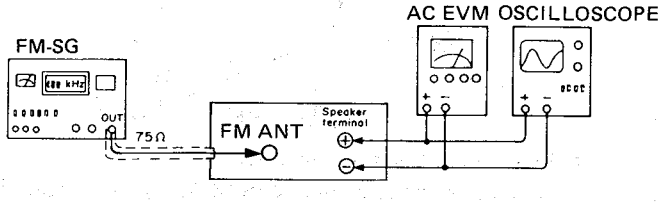
FM-RF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Place unit into FM position.
3. Place the radio dial and signal generator setting to **90.10MHz**.
4. Adjust **L106** for maximum output.
4. Place the radio dial and signal generator setting to **106.10MHz**.
5. Adjust **CT101** for maximum output.
6. Repeat steps 3.~5.

Note:

As three output reading will be present, adjustments must be made at center frequency.

FM SIGNAL GENERATOR CONDITION
Modulation.....100%
Modulation frequency.....400Hz
Output level.....66dB



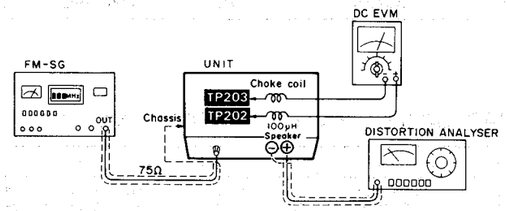
FM MONO DISTORTION ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "**FM**" position.
3. Place the radio frequency display and signal generator setting to **100.10 MHz.**
4. Adjust **T202** core so that voltage measured in signal mode is **0 mV (0±20 mV)** in 1 V range. **(SA-190)**
4. Adjust **T203** so that the distortion factor of Lch is minimized. **(SA-190L)**
5. Repeat steps 4 and 5 a few times.
6. Make sure that the distortion factors of Lch and Rch are nearly the same with each other to minimum.

Note:

The adjusting screwdriver used should be made of resin.

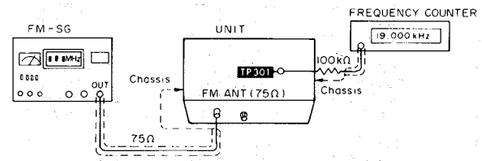
FM SIGNAL GENERATOR CONDITION
Modulation..... 100%
Modulation frequency..... 400 Hz
Output level..... 72dB



FM STEREO ADJUSTMENT (FREE RUN)

1. Test equipment connection is shown in figure.
2. Place unit into **"FM auto"** position.
3. Place the radio dial and signal generator setting to **100.10 MHz.**
4. Adjust **VR301** for **19 kHz±30 Hz** on frequency counter reading.
5. Tune a stereo broadcast and confirm the frequency stays at 19 kHz.

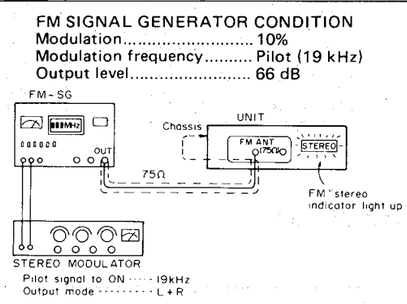
FM SIGNAL GENERATOR CONDITION
Modulation 0
Modulation frequency..... 0
Output level..... 66 dB

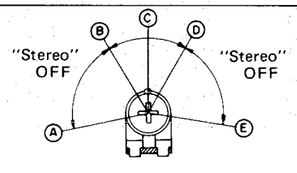


USING ALTERNATE SYSTEM

1. Apply stereo signal from generator or receive the stereo broadcast.
2. Adjust **VR301** until stereo indicator light up. Cement arm of **VR301** as shown figure.

FM SIGNAL GENERATOR CONDITION
Modulation..... 10%
Modulation frequency..... Pilot (19 kHz)
Output level..... 66 dB



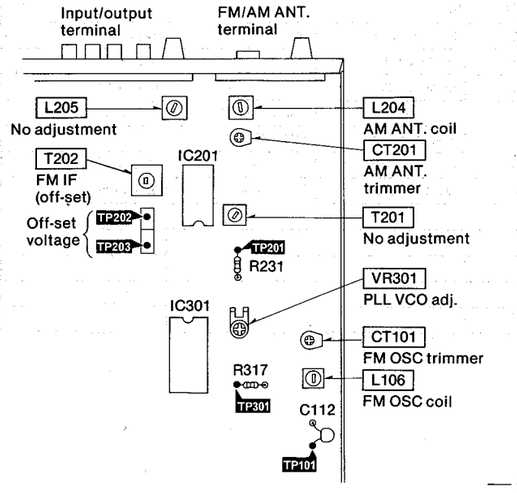


VR301

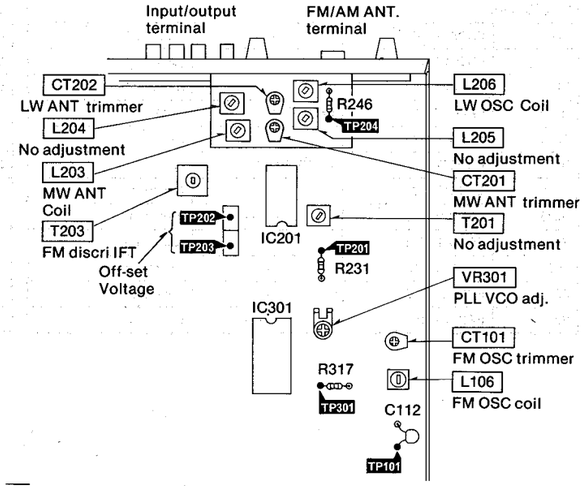
Ⓐ — Ⓑ,
Ⓓ — Ⓔ.....“Stereo” OFF position
Ⓑ — Ⓓ.....“Stereo” ON position (Indicator lighting)
Ⓒ.....Adjust point of pilot circuit

• Adjustment point

(SA-190)

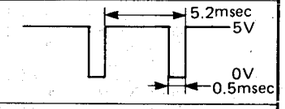
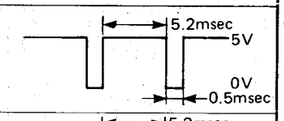
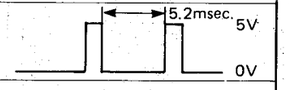


(SA-190L)

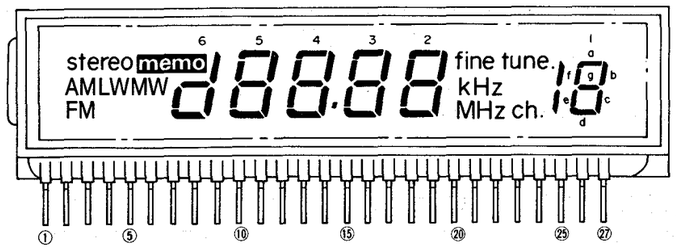


■ FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

• PLL CONTROLLER IC (IC901)

Pin No.	Mark	Description of terminal
1 ∫ 4 34 ∫ 52	LCD4 ∫ LCD1 LCD23 ∫ LCD5	Segment signal output terminal for display.
5	COM2	Common signal output terminal connected to LCD. Output is delivered in 3 values of earth, 1/2VDD and VDD (at 5 ms intervals) in a period of 50 Hz. The segment turns ON when the difference in voltage is ± VDD between these terminals and LCD1 ~ LCD23.
6	COM1	
7	VDD	Power supply terminal of device. Voltage of 5V ± 10% is supplied during operation of device. To hold the internal data memory (RAM), the voltage can be decreased to 2.5V. **Note:** Pins 7 and 33 are connected inside the chip. So, it is unnecessary to supply voltage to the pins.
8	FM	Input is local oscillation output (VCO) in a range of 10 ~ 130 MHz (0.3Vp-p, min.). There are 1/2 fixed frequency division prescaler and 2-step (1/32, 1/33) prescaler internally. Therefore, when deciding the frequency dividing value of programmable divider, it must be decided from the frequency obtained by halving the local oscillation output (VCO).
9	AM	Input is local oscillation output (VCO) in a range of 0.5 ~ 20 MHz (0.1Vp-p, min.). When the mode is shifted to FM, the AM terminal voltage automatically becomes the supply voltage of device.
10	GND	Ground terminal.
11	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
12	E02	
13	CE	Device selection signal input terminal. The signal level should be high when the device is operated, and low when not operated. With this terminal shifted to low level, LCD (liquid crystal display) turns off and the memory is held.
14	NC	Not used in this unit.
15	X1	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
16	X2	
17	A3 (SD)	Terminal to put in stop signal during auto tuning. The voltage is 5V with broadcast received, and 0V without broadcast received.
18	A2	Not used in this unit.
19	A1	FM/AM output terminal. (FM ⟶ 5V, AM ⟶ 0V)
20	A0	FM Auto/mono changeover output terminal. (auto ⟶ 0V, mono ⟶ 5V) LW changeover output terminal (MW ⟶ 0V, LW ⟶ 5V)
21 ∫ 24	K3 ∫ K0	Input terminal for key return signal from external key matrix. 
25 ∫ 28	B3 ∫ B0	Input terminal for key return signal from external key matrix. 
29	C3	Output terminal for key return signal to let the stereo indicator light up. 
30	C2	AF output signal detection terminal. When AF output is higher than AC 2V, Q904 turns ON and key return signal is put into No. 24 pin.
31	C1	FM/AM output terminal.
32	C0	Muting signal output terminal. Muting signal is put out during operation of FM/AM selector switch and tuning switch. (4V during muting)

■ DESCRIPTION OF LCD PANEL

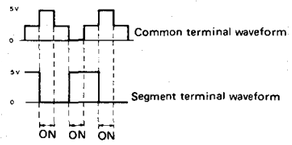


Common terminal — ①, ② Segment terminal — ③ ~ ㉗

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
COM 1	COM 1	—	MEMO	—	AM	—	FM,MHz	6b	5f	5e	5d	5a	4f	4e
COM 2	—	COM 2	—	LW	—	MW	6d,e,g	6c	5b	5g	5c	—	4b	4g

No.	15	16	17	18	19	20	21	22	23	24	25	26	27
COM 1	4d	4a	3f	3e	3d	3a	2a,c,d,f	kHz	stereo	ch	1d	1e	1f
COM 2	4c	■	3b	3g	3c	2b,e	2g	finetune	/	1a	1c	1g	1b

Lighting timing:
It turns on when the difference in voltage between common and segment terminals is 5V (VDD).



■ RESISTORS AND CAPACITORS

Notes:
- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
- Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
- The unit of resistance is Ω (ohm). K = 1000Ω, M = 1000kΩ
- The unit of capacitance is μF (microfarad). P = 10^{-6} μF
- Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	G : ± 2%
ERO : Metal Film	S2 : 1/4W	J : ± 5%
ERG : Metal Oxide	25 : 1/4W	K : ± 10%
ERX : Metal Oxide	S1 : 1/2W	

ERD10TLJ□□□ ⟶ Chip type carbon

Capacitor Type		Voltage: ECEA Type	Voltage: Other	Tolerance
ECE	Electrolytic	0J : 6.3V	1H : 50V	C : ± 0.25pF
ECC	Ceramic	1A : 10V	KC : 400V AC	J : ± 5%
ECK	Ceramic	1C : 16V		K : ± 10%
ECQP	Polypropylene	1E : 25V		Z : +80%, −20%
ECGN	Ceramic	1H : 50V		P : +100%, −0%
ECFTD	Semiconduction			
ECQ	Polyester			
RCB	Ceramic			

● RESISTORS (SA-190L [EF, EB, EK, EW])

Ref. No.	Part No.	Value
R1, 2	ERD10TLJ391U	390
R3, 4	ERD10TLJ224U	220K
R5, 6	ERO10MKG5622	56K
R7, 8	ERD10TLJ271U	270
R9, 10	ERD10TLJ680U	68
R11, 12	ERD10TLJ184U	180K
R13, 14	ERD10TLJ123U	12K
R15, 16	ERD10TLJ563U	56K
R17, 18	ERD10TLJ102U	1K
R102	ERDS2TJ102	1K
R103	ERDS2TJ151	150
R104	ERDS2TJ471	470
R105	ERDS2TJ333	33K
R107	ERDS2TJ474	470K
R110	ERDS2TJ221	220
R111	ERDS2TJ391	390
R112	ERDS2TJ221	220
R113	ERDS2TJ223	22K
R114	ERDS2TJ103	10K
R115	ERDS2TJ222	2.2K
R118	ERDS2TJ104	100K
R119	ERDS2TJ332	3.3K
R120	ERDS2TJ331	330
R121	ERDS2TJ562	5.6K
R201	ERDS2TJ103	10K
R202	ERDS2TJ182	1.8K
R203	ERDS2TJ223	22K
R204	ERDS2TJ822	8.2K
R205	ERDS2TJ104	100K
R206	ERDS2TJ473	47K
R207	ERDS2TJ102	1K
R215	ERDS2TJ223	22K
R216	ERDS2TJ563	56K
R217	ERDS2TJ471	470
R218	ERDS2TJ822	8.2K
R219	ERDS2TJ104	100K
R220	ERDS2TJ153	15K
R221, 222	ERDS2TJ122	1.2K
R223	ERDS2TJ473	47K
R224, 225	ERDS2TJ103	10K
R228	ERDS2TJ474	470K
R229	ERDS2TJ331	330
R230	ERDS2TJ824	820K
R231	ERDS2TJ471	470
R232	ERDS2TJ273	27K
R234, 235	ERDS2TJ104	100K
R236	ERDS2TJ103	10K
R239	ERDS2TJ334	330K
R240	ERDS2TJ102	1K
R241	ERDS2TJ471	470
R242	ERDS2TJ123	12K
R243	ERDS2TJ222	2.2K
R244	ERDS2TJ151	150
R245	ERDS2TJ122	1.2K
R246	ERDS2TJ102	1K
R248	ERDS2TJ471	470
R249	ERDS2TJ153	15K
R250	ERDS2TJ562	5.6K
R252	ERDS2TJ104	100K
R261	ERDS1FJ183	18K
R301	ERDS2TJ221	220
R304, 305	ERDS2TJ223	22K
R306	ERDS2TJ334	330K
R307, 308	ERDS2TJ332	3.3K
R309, 310	ERDS2TJ104	100K
R313	ERDS2TJ153	15K
R314	ERDS2TJ123	12K
R315	ERDS2TJ102	1K
R317, 318	ERDS2TJ103	10K
R507, 508	ERDS2TJ222	2.2K
R509, 510	ERDS2TJ561	560
R511, 512	ERDS2TJ183	18K
R513, 514	ERDS2TJ222	2.2K
R515, 516	ERDS2TJ124	120K
R517, 518	ERDS2TJ393	39K
R519, 520	ERDS2TJ222	2.2K
R521, 522	ERDS2TJ183	18K
R601, 602	ERDS2TJ102	1K
R603, 604	ERDS2TJ563	56K
R607, 608	ERDS2TJ123	12K

Ref. No.	Part No.	Value
R609, 610	ERDS2TJ473	47K
R613, 614	ERDS2TJ222	2.2K
R615, 616	ERDS2TJ272	2.7K
R619, 620	ERDS2TJ153	15K
R621, 622	ERDS2TJ102	1K
R625, 626 ⚠	ERDS1FJ100	10
R627, 628 ⚠	ERDS1FJ331	330
R629	ERD25FJ470	47
R630 ⚠	ERDS1FJ391	390
R633	ERD25FJ1R0	1
R634 ⚠	ERD25FJ820	82
R635	ERDS1FJ221	220
R636 ⚠	ERD25FJ1R0	1
R701, 702	ERX1ANJR27	0.27
R703	ERD25FJ181	180
R704, 705	ERDS2TJ393	39K
R706	ERG2ANJ220	22
R707 ⚠	ERDS1FJ152	1.5K
R708	ERDS2TJ821	820
R709	ERDS2TJ102	1K
R710	ERDS2TJ272	2.7K
R711	ERDS2TJ222	2.2K
R712 ⚠	ERDS1FJ152	1.5K
R713	ERDS2TJ221	220
R714 ⚠	ERD25FJ470	47
R901	ERDS2TJ103	10K
R903	ERDS2TJ561	560
R904	ERDS2TJ153	15K
R906	ERDS2TJ332	3.3K
R907	ERDS2TJ473	47K
R908	ERDS2TJ103	10K
R909	ERDS2TJ562	5.6K
R910	ERDS2TJ681	680
R911, 912	ERDS2TJ102	1K
R921	ERDS2TJ221	220
R922	ERDS2TJ101	100

● CAPACITORS (SA-190L [EF, EB, EK, EW])

Ref. No.	Part No.	Value
C1, 2	ECEA1HU3R3	3.3
C3, 4	ECCD1H101K	100P
C5, 6	ECKD1H102KB	0.001
C7, 8	ECFTD223KXL	0.022
C9, 10	ECFTD682KXL	0.0068
C11, 12	ECEA1HU010	1
C13, 14	ECEA0JU330	33
C104	RCBS1H180JCY	18P
C106	RCBS1H220JCY	22P
C107, 108	RCBS1H102KBY	1000P
C109	RCBS1H4R7KCY	4.7P
C110	RCBS1H121KBY	120P
C111	RCBS1H1R8MCY	1.8P
C115	RCBS1H180JCY	18P
C116	RCBS1H181KBY	180P
C118	ECKD1H103ZF	0.01
C119	ECKD1H103ZF	0.01
C120	RCBS1H102KBY	1000P
C121	RCBS1H6R8KCY	6.8P
C122	ECKD1H223ZF	0.022
C123	RCBS1H390JLY	39P
C125	RCBS1H6R8KCY	6.8P
C126	RCBS1H2R7KCY	2.7P
C127	RCBS1H102KBY	1000P
C128	RCBS1H180JCY	18P
C129	RCBS1H1R0MCY	1P
C130	RCBS1H102KBY	1000P
C140, 141	ECKD1H103ZF	0.01
C201	ECQM1H473KV	0.047
C202	ECCD1H180KC	18P
C203	ECQP1471JZ	470P
C204	ECQP1391JZ	390P
C206	ECKD1H223ZF	0.022
C208	ECKD1H103ZF	0.01
C209	ECCD1H470K	47P
C211	ECKD1H223ZF	0.022
C212	ECCD1H080CC	8P
C213	ECCD1H470K	47P
C214	ECEA0JU101	100
C215	ECEA1HU4R7	4.7
C216	ECKD1H103ZF	0.01
C217	ECKD1H223ZF	0.022
C218	ECFTD183KXL	0.018
C219	ECEA1HU2R2	2.2
C220	ECEA1HU4R7	4.7
C222	ECEA1CU100	10
C223	ECEA1HU010	1
C224	ECKD1H103ZF	0.01
C225	ECEA1CU100	10
C226	ECKD1H331KB	330P
C227	ECKD1H223ZF	0.022
C229	ECCD1H103ZF	0.01
C231	ECCT1H220K	22P
C232	ECEA1CU100	10
C301	ECEA1CU101	100
C304, 305	ECEA1HUR47	0.47
C306, 307	ECFTD153KXL	0.015
C310	ECQP1471JZ	470P
C311	ECEA1HU010	1
C312	ECFTD473KXL	0.047
C313	ECEA1HU3R3	3.3
C314	ECEA1HUR47	0.47
C315	ECKD1H103ZF	0.01
C407, 408	ECKD1H103ZF	0.01
C513, 514	ECFTD332KXL	0.0033
C515, 516	ECFTD223KXL	0.022
C517, 518	ECFTD183KXL	0.018
C519, 520	ECFTD104KXL	0.1
C521, 522	ECFTD563KXL	0.056
C523, 524	ECKD1H331KB	330P
C601, 602	ECEA1HN4R7S	4.7
C603, 604	ECCD1H101K	100P
C605, 606	ECCD1H101K	100P
C607, 608	ECEA1HU330	33
C609, 610	ECCD1H050CC	5P
C611, 612	ECEA1HN3R3S	3.3
C615	ECEA1HU100S	10
C617 ⚠	ECEA1HU330	33
C618	ECEA1JU220	22
C619, 620	ECKD1H473ZF	0.047
C623, 624	ECEA1CN100S	10
C635, 636	ECCD1H150KC	15P
C701	ECKDKC103PF2	0.01
C702	ECQE1104KN	0.1
C703, 704 ⚠	ECETS45V472U	4700
C705	ECEA0JU470	47
C707	ECEA1HU470	47
C708	ECEA1VU4R7	4.7
C709	ECEA1VU470	47
C710	ECKD1H103ZF	0.01
C711	ECEA1AU101	100
C712, 713	ECKD1H103ZF	0.01
C714	ECKD1H103ZF	0.01
C715	ECEA1EU101	100
C717	ECKD1H223ZF	0.022
C901	ECEA25M4R7R	4.7
C902	ECKD1H103ZF	0.01
C903	ECEA1HU010	1
C904	ECKD1H223ZF	0.022
C906	ECCD1H470K	47P
C907	ECCD1H100KC	10P
C908	EECF5R5U473	0.047
C910	ECEA0JU471	470
C913	ECKD1H103ZF	0.01
C914	ECCD1H150KC	15P
C915	ECEA1HU3R3	3.3
C916	ECEA1HKS010	1
C918	ECCD1H121K	120P
C921	ECEA1CU221	220
C922	ECKD1H103ZF	0.01
C930	ECEA1HU010	1

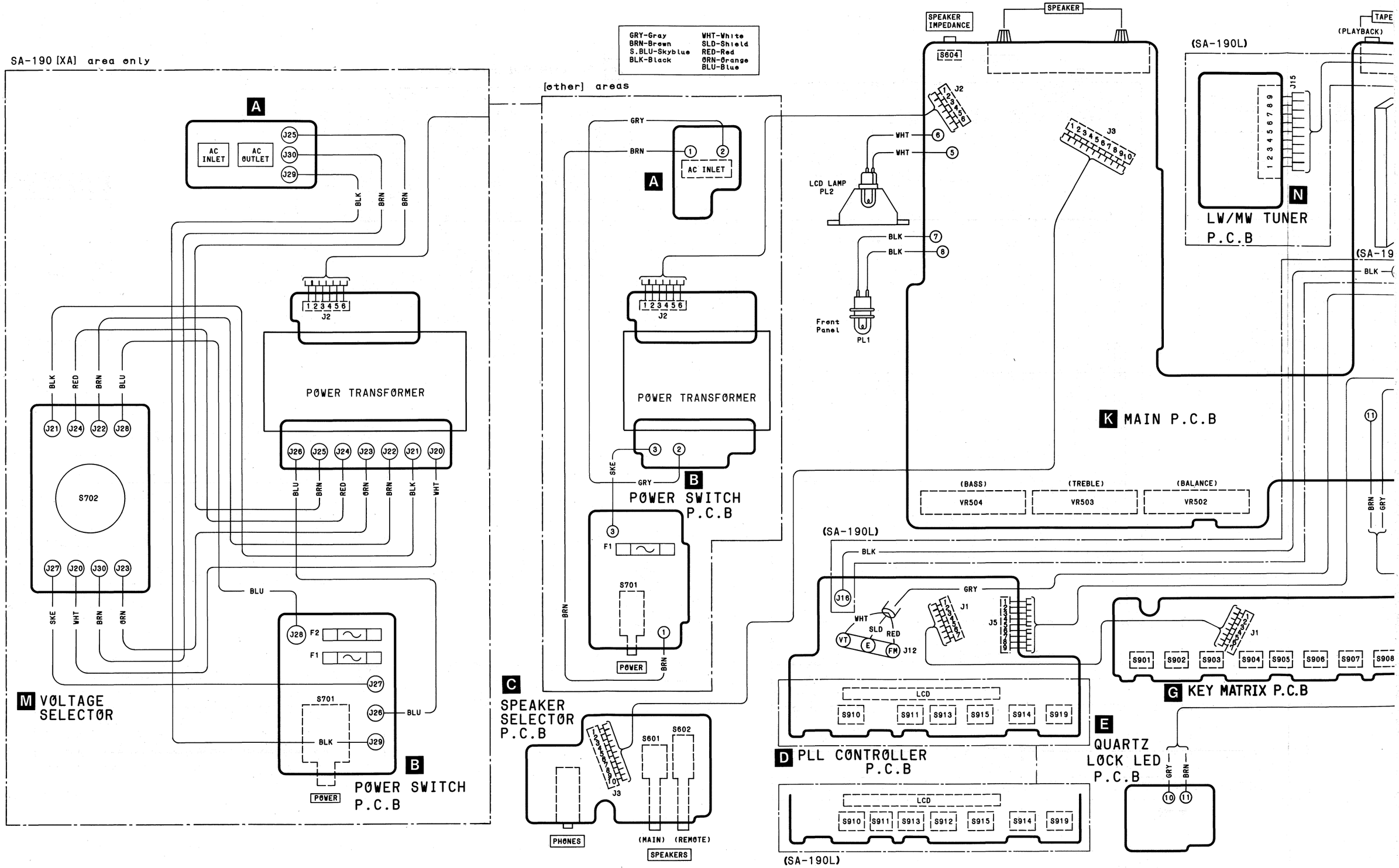
● Change of Parts List (SA-190 from SA-190L)

Capacitor and Resistor Parts

Ref. No.	Change of Part No.: SA-190L [EK]	➡ SA-190 [EX, EH, XL, XA]	Description
RESISTORS			
R201	ERDS2TJ103	———	(Deletion)
R202	ERDS2TJ182	———	(Deletion)
R203	ERDS2TJ223	———	(Deletion)
R204	ERDS2TJ822	ERDS2TJ102	1KΩ
R206	ERDS2TJ473	———	(Deletion)
R207	ERDS2TJ102	ERDS2TJ821	820Ω
R222	ERDS2TJ122	———	(Deletion)
R246	ERDS2TJ102	———	(Deletion)
R261	ERDS1FJ183	———	(Deletion)
R904	ERDS2TJ153	———	(Deletion)
R906	ERDS2TJ332	———	(Deletion)
R911	ERDS2TJ102	———	(Deletion)

Ref. No.	Change of Part No.: SA-190L [EK]	➡ SA-190 [EX, EH, XL, XA]	Description
CAPACITORS			
C202	ECCD1H180K	RCBS1H120JCY	12pF
C204	ECQP1391JZ	———	(Deletion)
C206	ECKD1H223ZF	———	(Deletion)
C230	———	ECKD1H223ZF	(Addition) 0.022μF
C232	ECEA1CU100	ECEA1HU010	1μF
C903	ECEA1HU010	———	(Deletion)
C904	ECKD1H223ZF	———	(Deletion)

■ WIRING CONNECTION DIAGRAM



GRY-Gray
BRN-Brown
S.BLU-Skyblue
BLK-Black
WHT-White
SLD-Shield
RED-Red
ORN-Orange
BLU-Blue

[other] areas

GRY
BRN
AC INLET
A
J2
POWER TRANSFORMER
SKE
GRY
B
POWER SWITCH P.C.B
F1
S701
BRN
POWER
BRN
C
SPEAKER SELECTOR P.C.B
S601
S602
J3
PHONES
(MAIN) (REMOTE)
SPEAKERS

SPEAKER IMPEDANCE
S604
SPEAKER
J2
WHT 6
WHT 5
LCD LAMP PL2
BLK 7
BLK 8
Front Panel
PL1
J3
K MAIN P.C.B
(BASS) (TREBLE) (BALANCE)
VR504 VR503 VR502

(SA-190L)
J15
N
LW/MW TUNER P.C.B

TAPE/EXT
(PLAYBACK) (REC OUT)
CD/AUX
PHONO
GND
FM ANT 75Ω
GND
AM ANT
AM LOOP ANT
L
EQUALIZER AMPLIFIER P.C.B
J15

(SA-190L)
BLK J16
WHT
SLD
RED
GRY
VT E FM J12
J5
10
S504 S503 S502 S501
(TAPE MONITOR) (CD/AUX) (TUNER) (PHONO)
INPUT SELECTOR
11
J4
S603
LOUDNESS
BRN
GRY

(SA-190L)
BLK
J16
GRY
WHT
SLD
RED
VT E FM J12
J1
J5
LCD
S910 S911 S913 S915 S914 S919
D PLL CONTROLLER P.C.B
LCD
S910 S911 S913 S912 S915 S914 S919
(SA-190L)

J1
S901 S902 S903 S904 S905 S906 S907 S908
G KEY MATRIX P.C.B

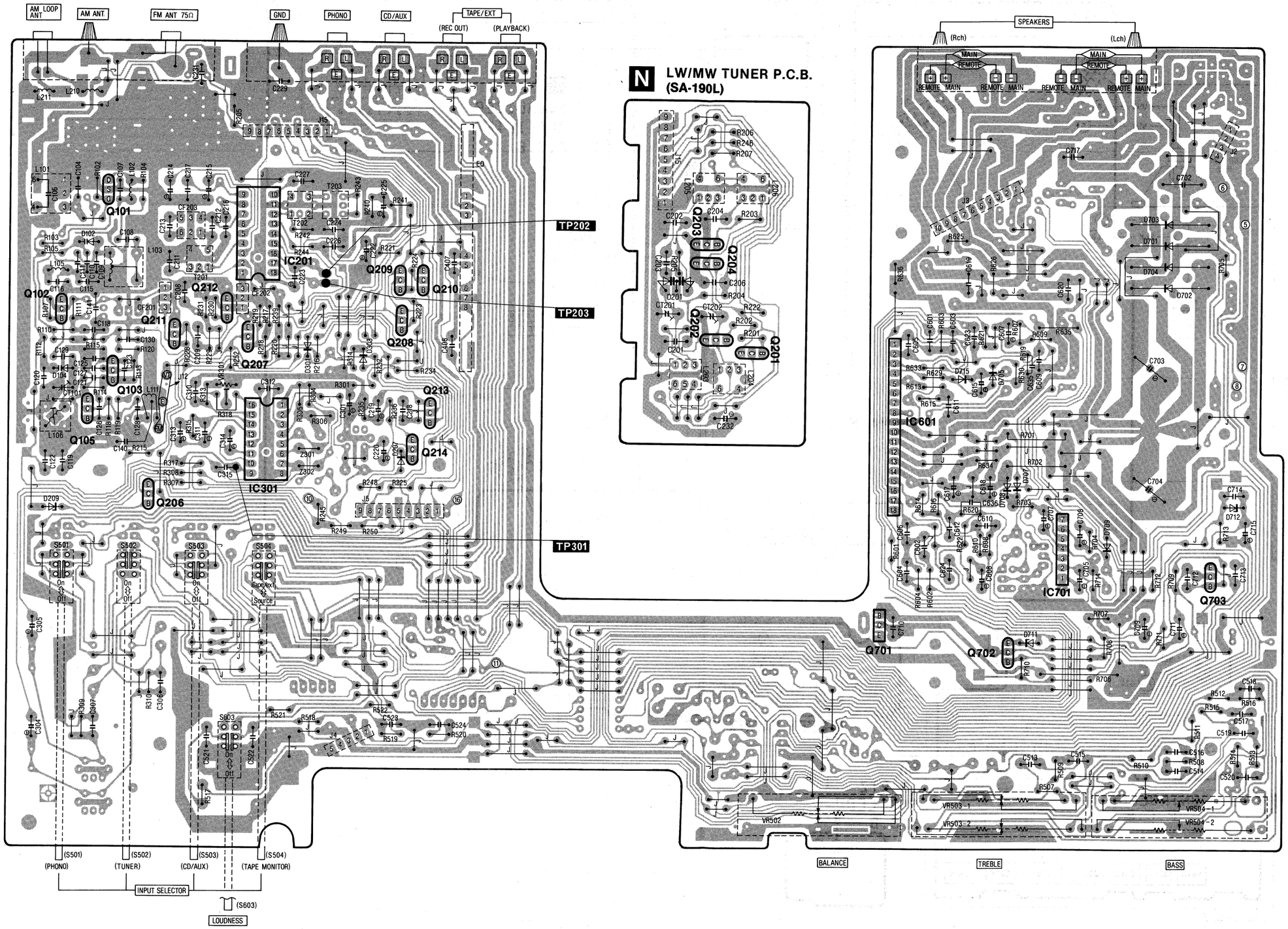
E
QUARTZ LOCK LED P.C.B
GRY
BRN
10 11

I
VOLUME CONTROL P.C.B
J4
VR501
(VOLUME)

SA-190/190L SA-190/190

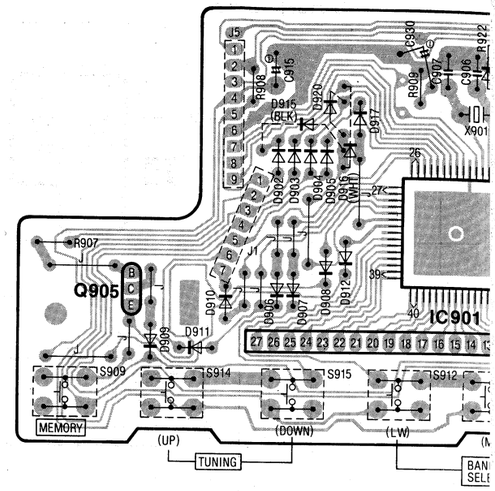
■ PRINTED CIRCUIT BOARDS

K MAIN P.C.B. (SA-190L)

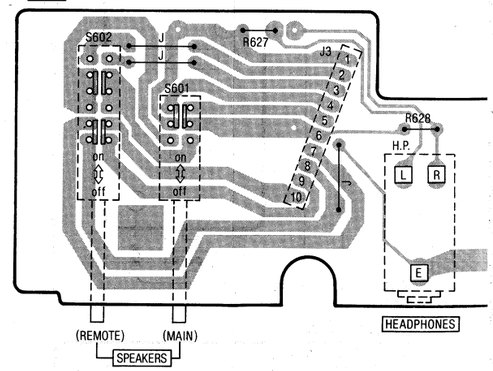


N LW/MW TUNER P.C.B. (SA-190L)

D PLL CONTROLLER P.C

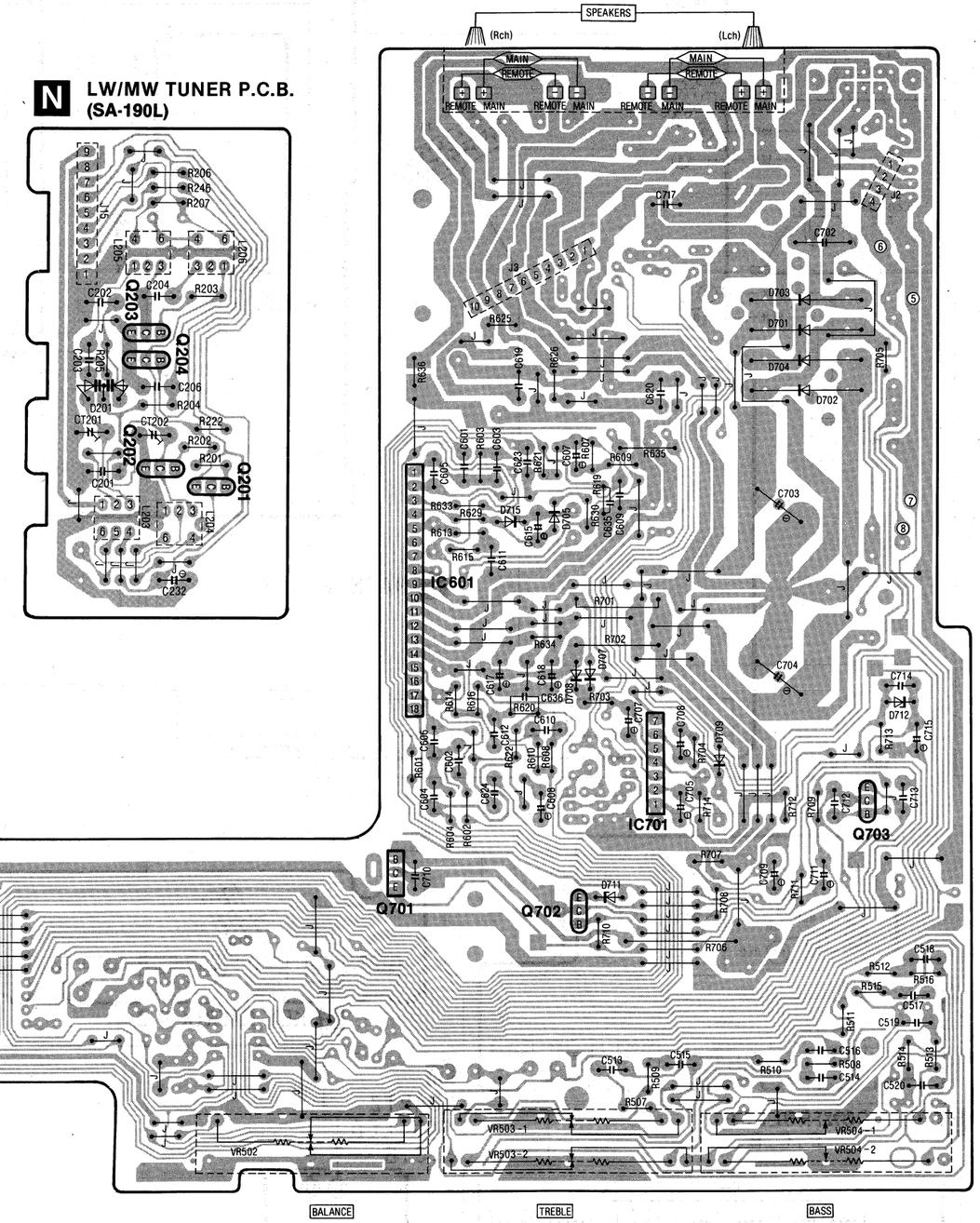


C SPEAKER SELECTOR P.C.B. (SA-190L, SA

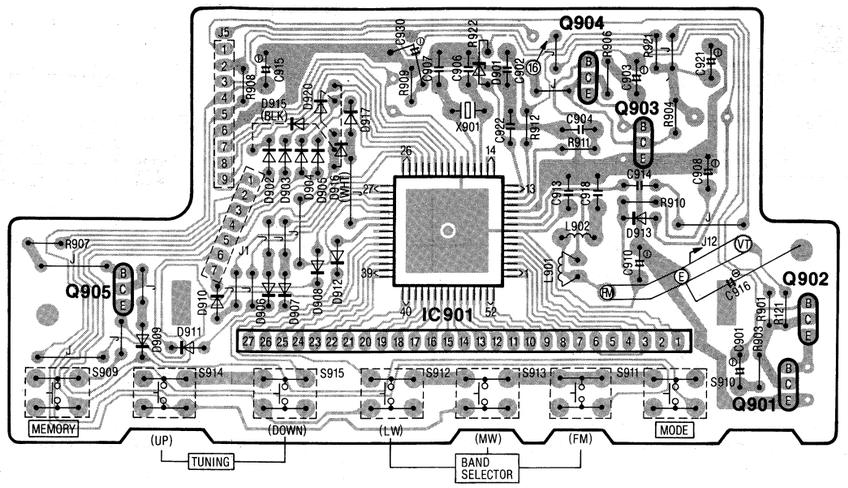


5 6 7 8 9 10 11 12 13 14

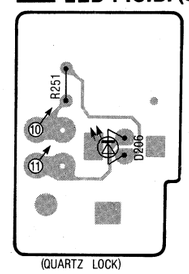
N LW/MW TUNER P.C.B. (SA-190L)



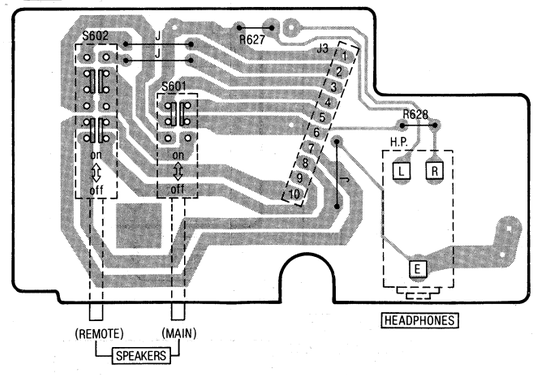
D PLL CONTROLLER P.C.B. (SA-190L)



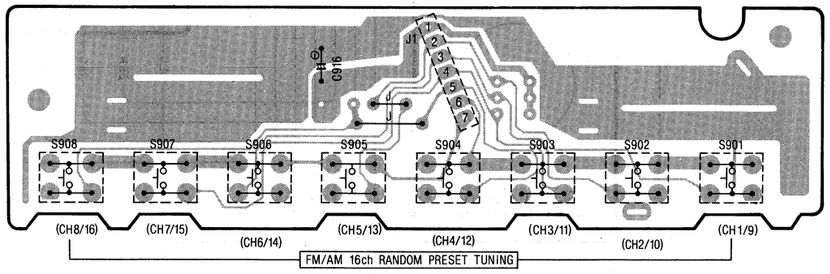
E QUARTZ LOCK LED P.C.B. (SA-190L, SA-190)



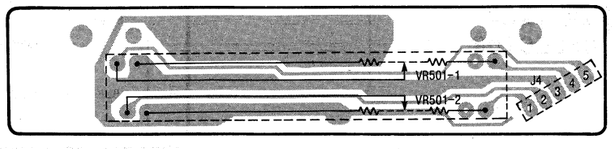
C SPEAKER SELECTOR P.C.B. (SA-190L, SA-190)



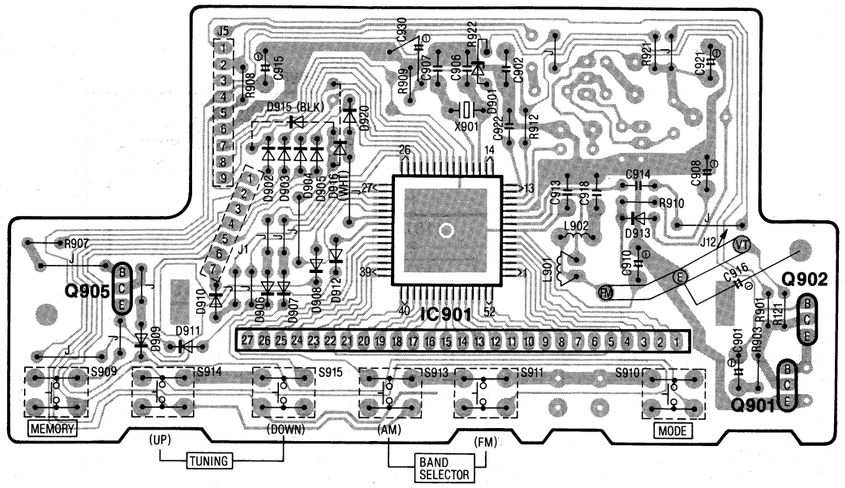
G KEY-MATRIX P.C.B. (SA-190L, SA-190)



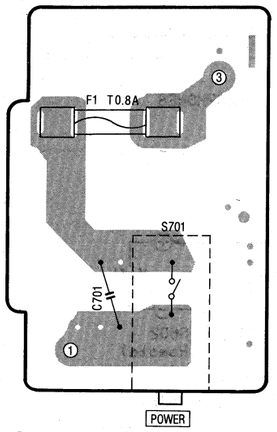
H VOLUME CONTROL P.C.B. (SA-190L, SA-190)



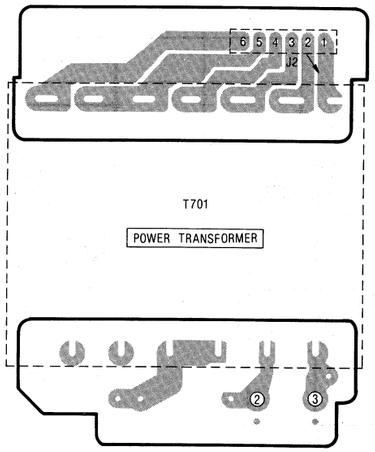
D PLL CONTROLLER P.C.B. (SA-190)



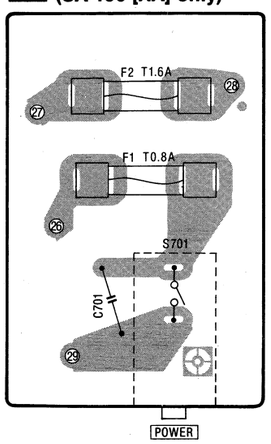
B POWER SWITCH P.C.B. (SA-190L/SA-190)



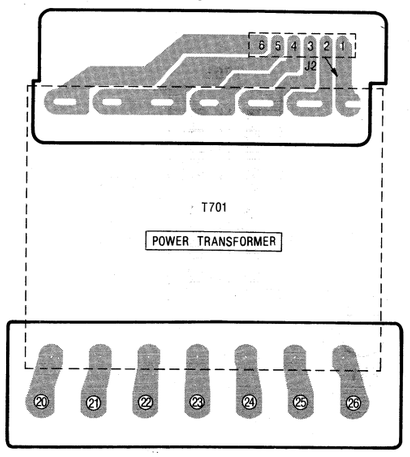
(SA-190L, SA-190)



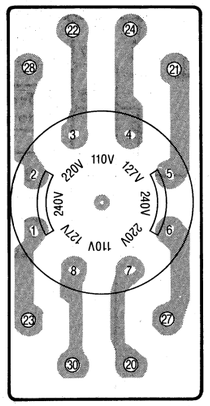
B POWER SWITCH P.C.B. (SA-190 [XA] only)



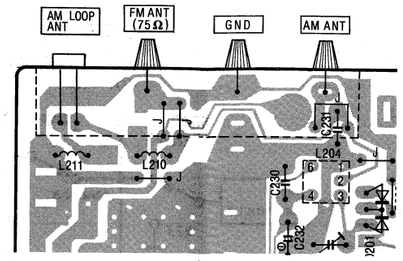
(SA-190 [XA] only)



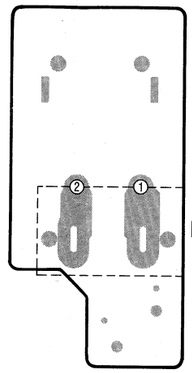
M VOLTAGE SELECTOR (SA-190 [XA] only)



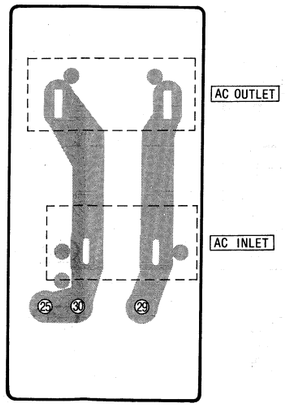
SA-190 [XA, XL] only



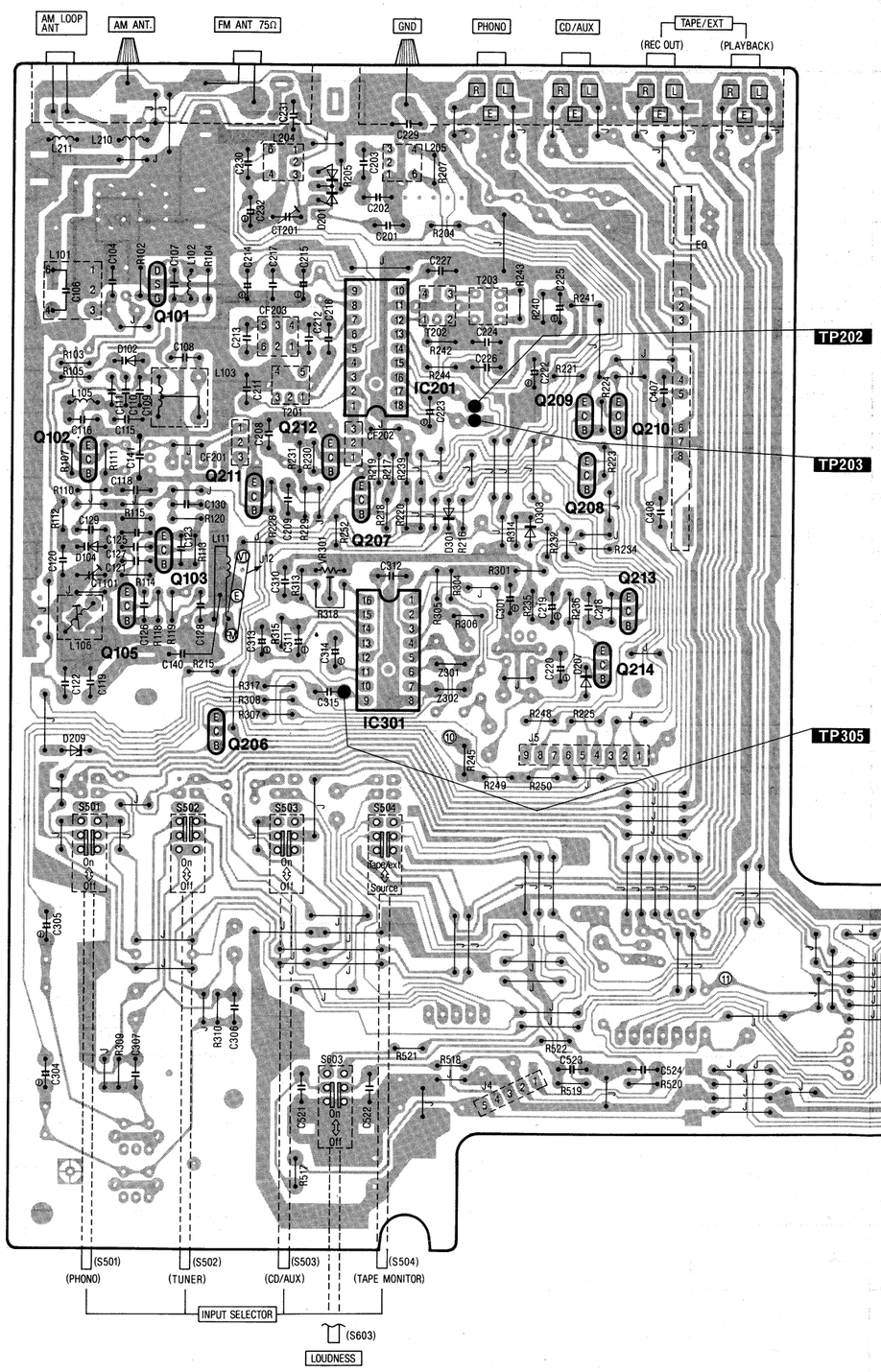
A (SA-190L, SA-190)



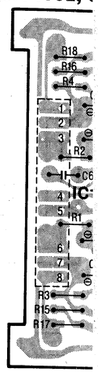
A (SA-190 [XA] only)

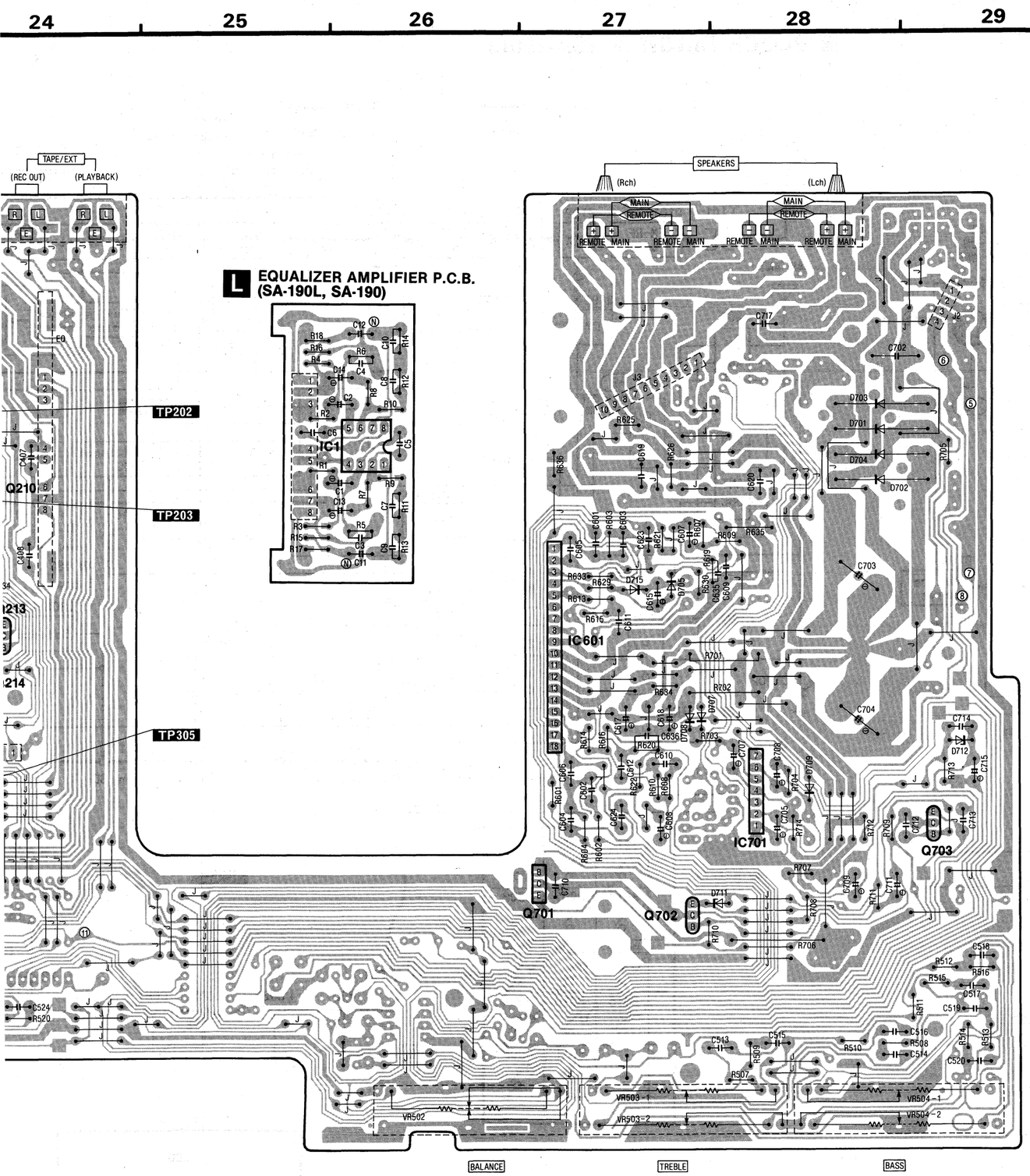


K MAIN P.C.B. (SA-190)

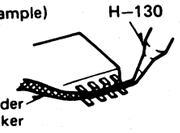
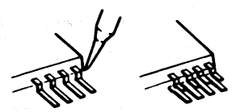
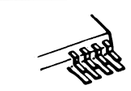


L EQUALIZE (SA-190L, S





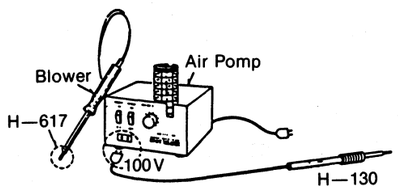
■ HOW TO REPLACE IC'S (Small outline type)

	Replacing procedure		Cautions
1	Reduce the amount of solder on each pin of the integrated circuit by use of a solder sucker.	(Example) H—130  Solder sucker	• Recommended tool .....Special soldering iron * H605M and H-130. * H605E and H-130. • Do not touch the soldering iron to the area for a long time. It may otherwise cause removal of the print foil. • When shifting the pin upward, do the job quickly while the solder is melting. If the solder is hard, it may cause removal or breakage of the print foil. • When using a pencil type soldering iron. 1. Completely remove the solder from each IC pin by use of solder sucker. 2. Raise each pin by means of an eyeleteer, hold the pliers then remove IC package from P.C.B.
2	Melt the solder on the pin (one electrode) with the soldering iron.		
3	While the solder is melting, shift the pin upward by the soldering iron to remove it from the foil.		
4	Remove each pin from the foil according to the above-mentioned procedure.		

*** Special soldering iron**
(Refer to Technical Information, ORDER NO. GAD84125486T1)...For U.S.A. and Canada
(Refer to Technical Information, ORDER NO. GAD84115476T8)...For others

•H—605 Spot Heater (hot-air solder iron)
This device that uses hot air to melt solder was developed to remove Flat-Pakage ICs, RHCs and chip parts.

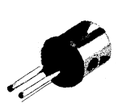
- H—605M (For 120V power source)
- H—605E (For 200V/220V/240V power source)

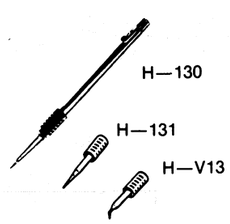


•H—617 Twin Nozzle (for spot heater)
Special nozzle for the removal of RHCs and chip resistors. (Nozzle diameter: 1.0mm×2)

•H—130 Slim Pencil Solder Iron
An ultrasmall ceramic heater solder iron is extremely handy for soldering chip parts, RHCs, ICs etc., to high-density circuit boards.
Features:

• Rated power:	100V, 15W
• Max. temp.:	400°C
• Heater:	ceramic (long life)
• Insulation resistance:	100MΩ
• Length:	178mm
• Weight:	16g (not including cord)

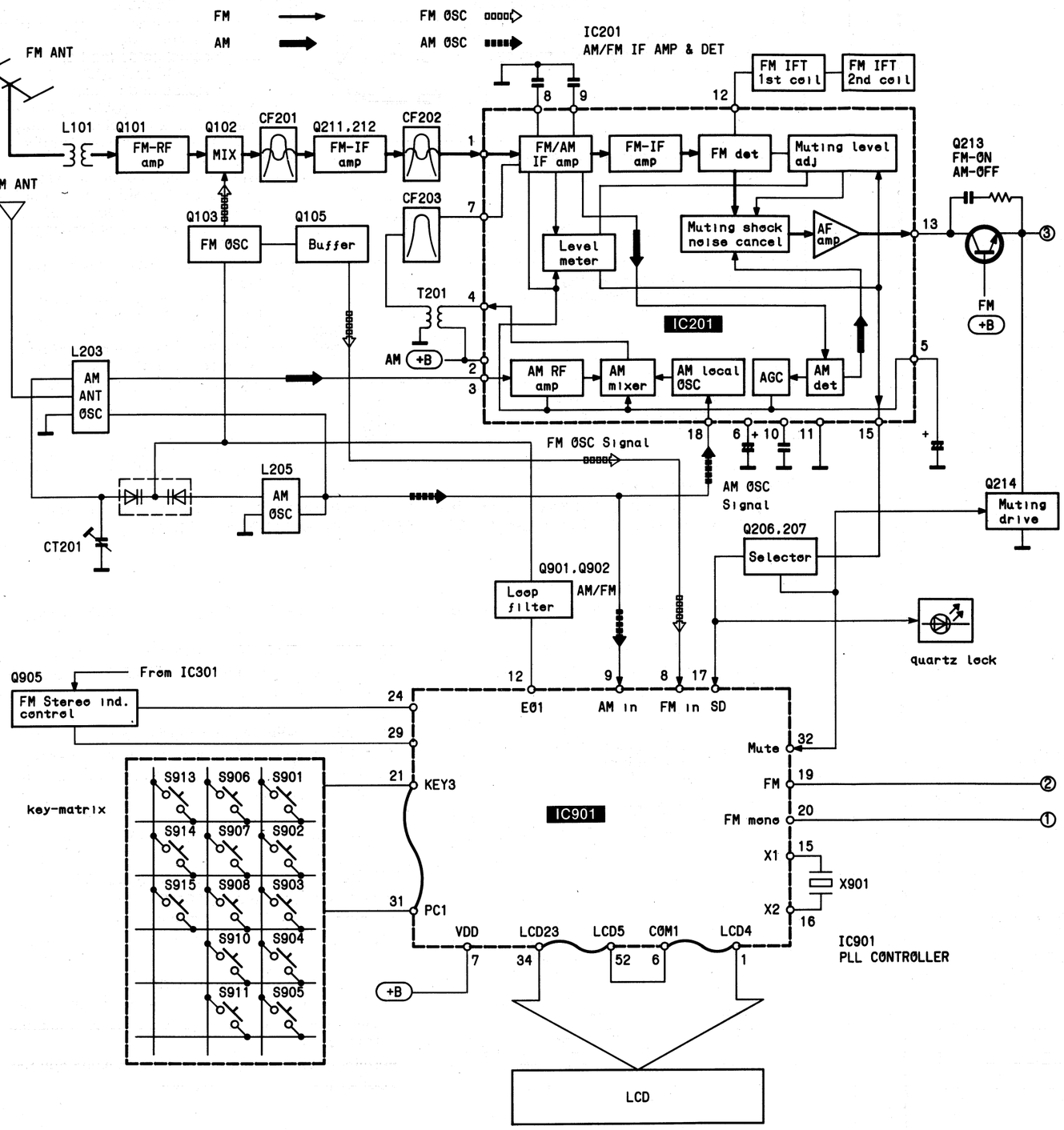




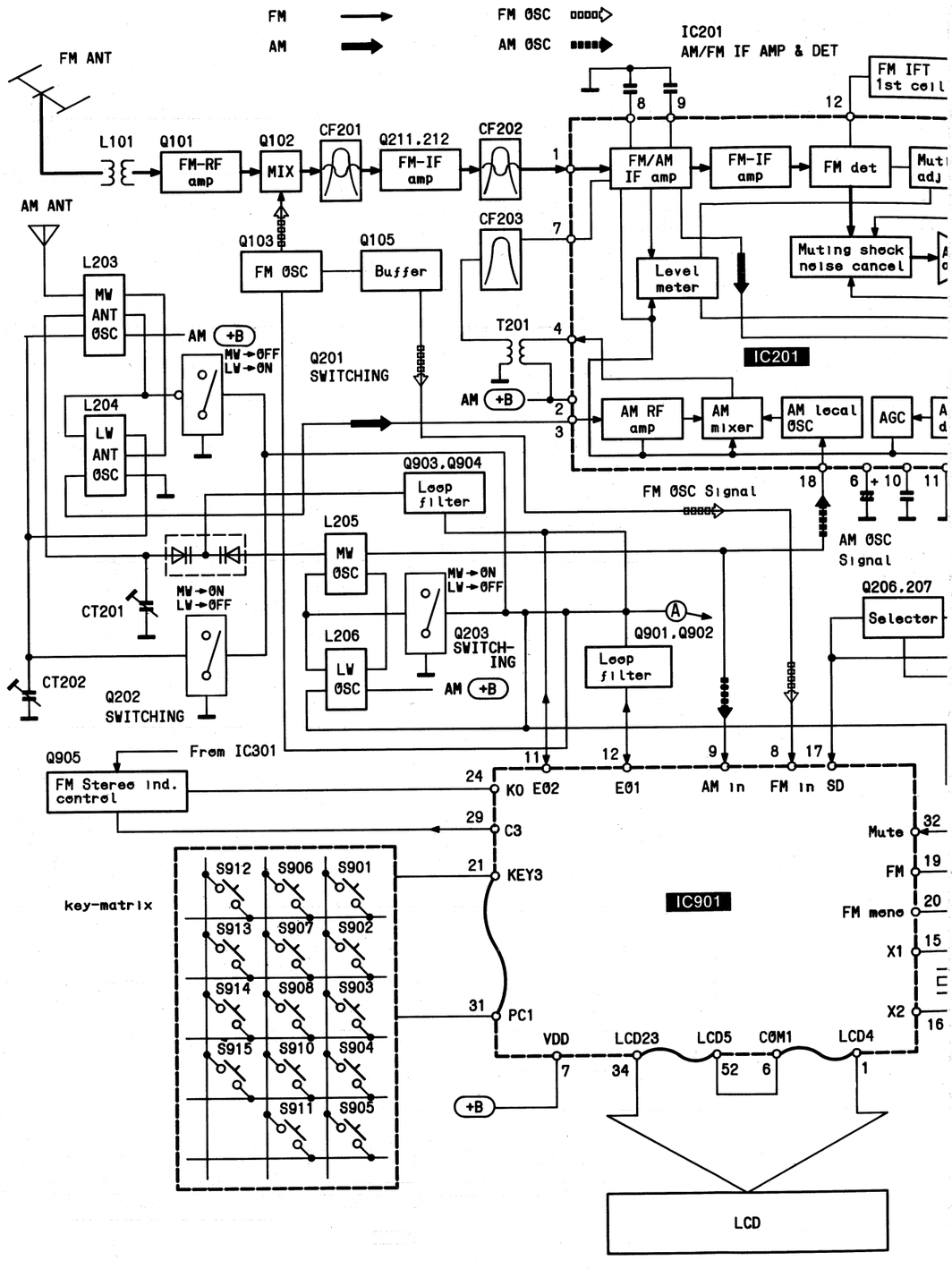
•H—131, H—V13 Cap Bits
Solder tip for the slim pencil Solder Iron and is composed of a bit holder and a corrosion resistance solder tip.
Permits changing of solder tips even while still hot.

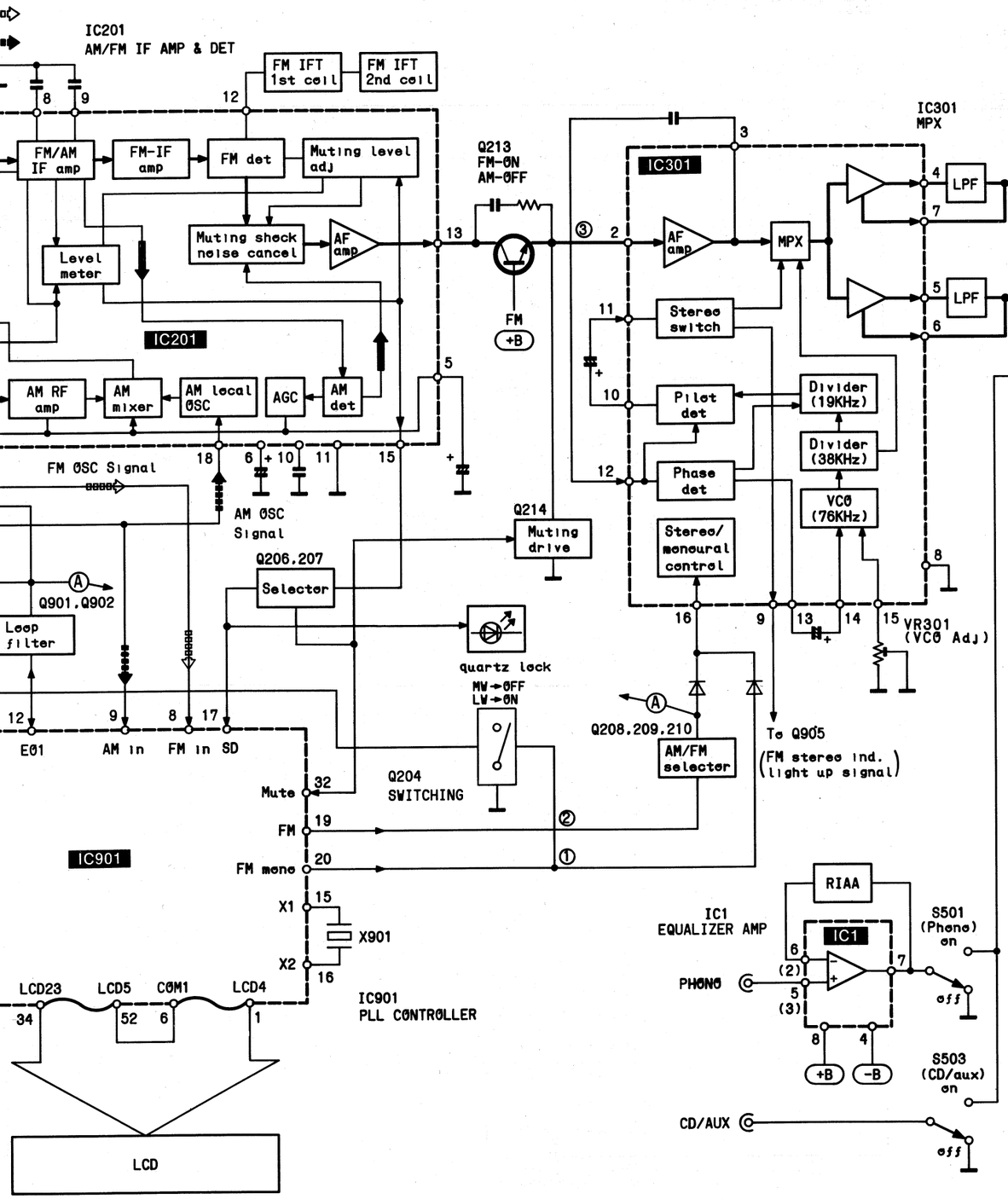
• Solder tip:	0.3mm

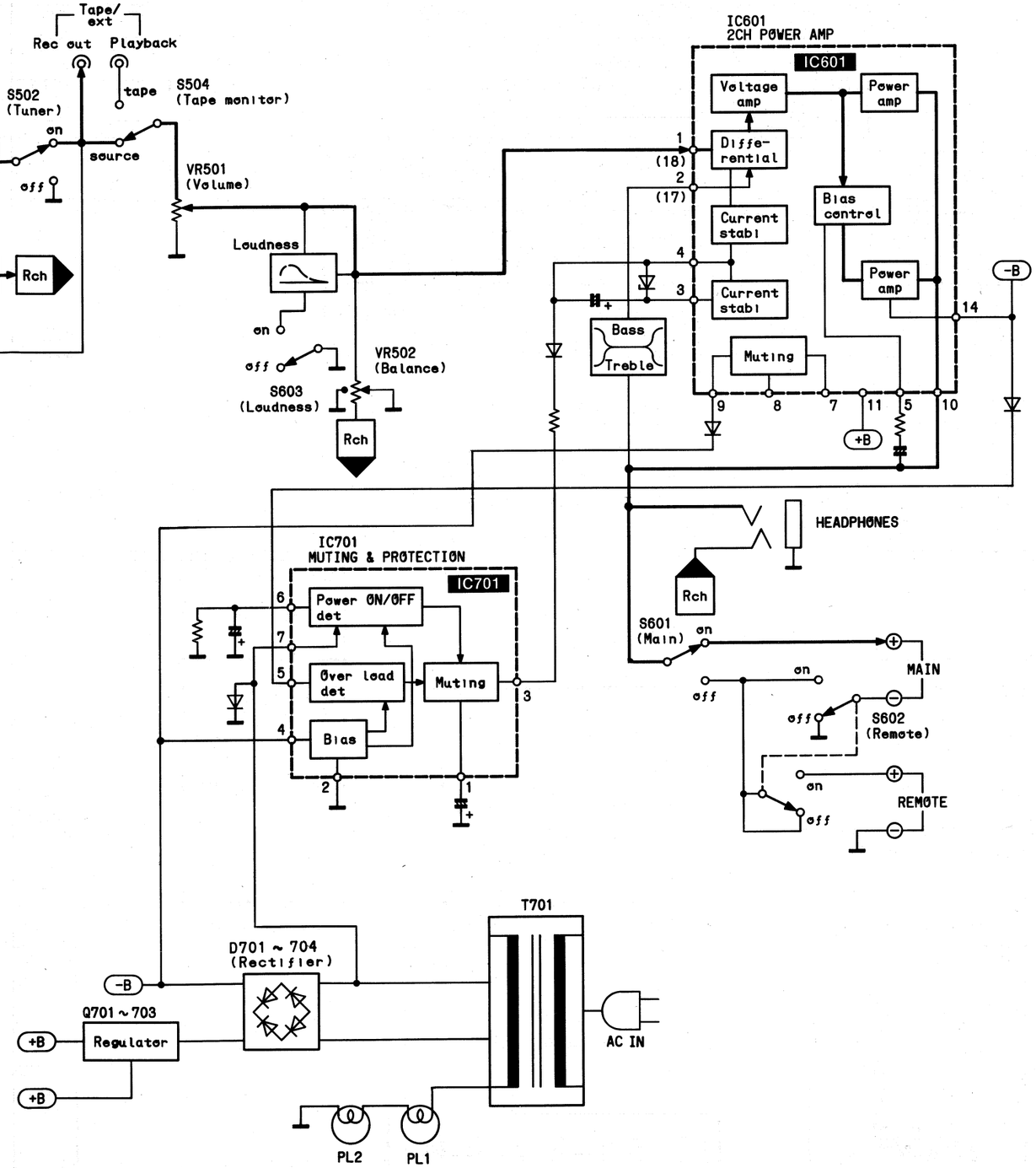
■ BLOCK DIAGRAM (SA-190)



■ BLOCK DIAGRAM (SA-190L)

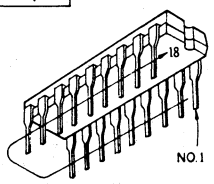



IC201
AM/FM IF AMP & DET
FM IFT 1st coil
FM IFT 2nd coil
FM/AM IF amp
FM-IF amp
FM det
Muting level adj
Muting shock noise cancel
AF amp
Level meter
IC201
AM RF amp
AM mixer
AM local OSC
AGC
AM det
FM OSC Signal
AM OSC Signal
Q213
FM-ON
AM-OFF
FM
+B
Q214
Muting drive
Q206,207
Selector
Q901,Q902
Loop filter
quartz lock
MW→OFF
LW→ON
E01
AM in
FM in
SD
Mute
FM
FM mono
X1
X2
X901
IC901
PLL CONTROLLER
LCD23
LCD5
COM1
LCD4
LCD
Q204
SWITCHING
IC301
MPX
AF amp
MPX
Stereo switch
Pilot det
Phase det
Stereo/ monoural control
Divider (19KHz)
Divider (38KHz)
VCO (76KHz)
LPF
LPF
De-emphasis
De-emphasis
Rch
VR301
(VCO Adj)
Q208,209,210
AM/FM selector
To Q905
(FM stereo ind. light up signal)
Tape/ ext
Rec out
Playback
tape
S502
(Tuner)
S504
(Tape monitor)
on
off
source
VR501
(Volume)
Loudness
VR502
(Balance)
S603
(Loudness)
Rch
IC1
EQUALIZER AMP
RIAA
S501
(Phono)
PHONO
S503
(CD/aux)
CD/AUX

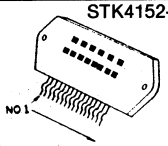

IC601
2CH POWER AMP
Voltage amp
Power amp
Differential
Bias control
Current stabi
Current stabi
Power amp
Bass
Treble
Muting
HEADPHONES
Rch
S601
(Main)
MAIN
S602
(Remote)
REMOTE
IC701
MUTING & PROTECTION
Power ON/OFF det
Over load det
Muting
Bias
D701 ~ 704
(Rectifier)
Q701 ~ 703
Regulator
T701
AC IN
PL2
PL1

■ TERMINAL GUIDE OF TRANSISTORS, DIODES AND IC'S

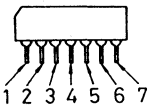
SVINJ4559DDM	8 pin
AN7273A	18 pin
SVIμPC1161C3	16 pin



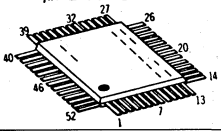
STK4152-2M



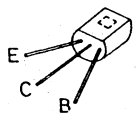
AN7072N



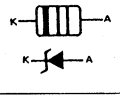
μPD1718G512



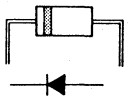
2SC1685C



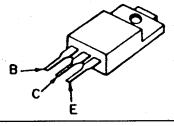
MA4110M, MA4062M MA4160M



SVDS2V20

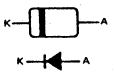


2SD12650

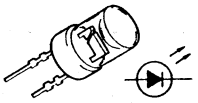


MA325GIN

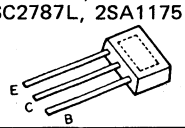
1SS254, MA150LF



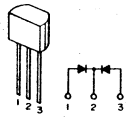
SLV31VC3



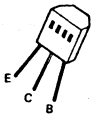
2SC2786M, 2SC2785F
2SC2787L, 2SA1175F



KV1260Z



2SK241GR



Note 1:

1. **S501~S503** : Input selector switch in "**tuner**" position.
   [S501 —— phono S502 —— tuner
   S503 —— CD/aux]
2. **S504** : Tape monitor selector switch in "**source**" position.
   (▂ tape/ext, ▉ source)
3. **S601** : Main speaker switch in "**on**" position.
   (▂ on, ▉ off)
4. **S602** : Remote speaker switch in "**off**" position.
   (▂ on, ▉ off)
5. **S603** : Loudness switch in "**off**" position.
   (▂ on, ▉ off)
6. **S701** : Power switch in "**on**" position.
   (▂ on, ▉ off)
7. **S702** : Voltage selector switch in "**240V**" position.
   (110V ↔ 127V ↔ 240V ↔ 220V) (SA-190 [XA] area only)
8. **S901~S908** : Preset tuning switch.
   [S901 —— CH1/CH9 S902 —— CH2/CH10
   S903 —— CH3/CH11 S904 —— CH4/CH12
   S905 —— CH5/CH13 S906 —— CH6/CH14
   S907 —— CH7/CH15 S908 —— CH8/CH16]
9. **S909** : Memory switch in "**manual**" position.
   (manual —— auto)
10. **S910** : FM mode selector switch in "**mono**" position.
    (auto —— mono)
11. **S911~S913** : Band mode selector switch in "**FM**" position.
    (S911 —— FM, S912 —— LW (SA-190L only),
    S913 —— MW)
12. **S914, S915** : Tuning switch.
    (S914 —— up, S915 —— down)
13. ⇨ FM signal line ▬▶ AM (MW), LW signal line
    ▫▫▫▷ FM OSC ▒▒▒ AF signal line
    ▪▪▪▶ AM (MW), LW OSC ——— Positive and negative voltage line
14. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

- Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
  All voltage values shown in circuitry are DC voltage in FM signal (Monaural signal) reception mode.
  Figures in ( ) stand for DC voltage in AM signal reception mode.

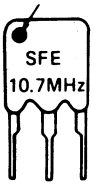
Part No.	Original Part No.	Supplyment Part No.
D915, D916	MA150	MA162A

Note 2:

- **Use of ceramic filters in pairs**

The ceramic filters (CF201, CF202 and CF203) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair.
At repairing and replacement, pay close attention to the diode (D915, D916) for use as different diodes must be used depending on each rank of the ceramic filters.

Color marking

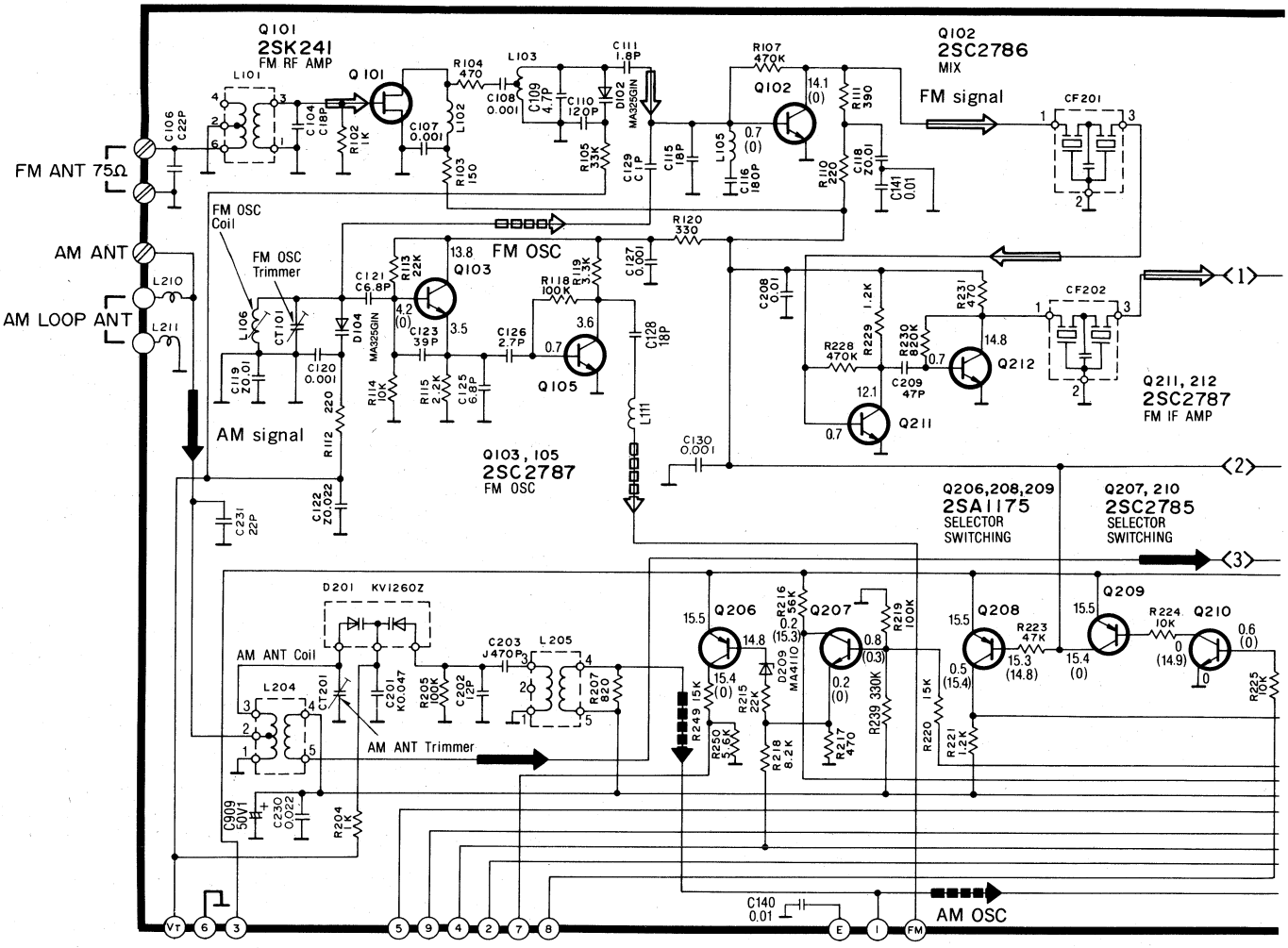


RANK (Color)	D915	D916	CENTER FREQUENCY
Red	X	X	10.70 MHz
White	X	○	10.75 MHz
Black	○	X	10.65 MHz

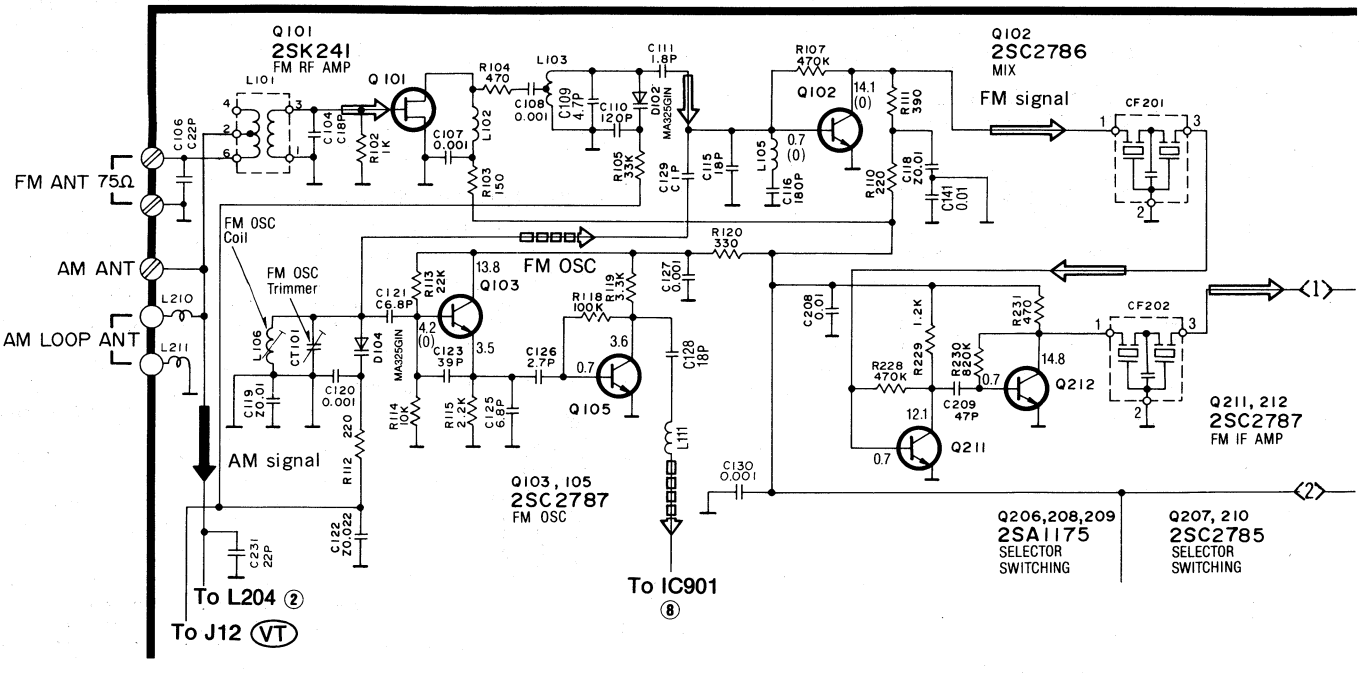
Note: ○ Mark Diode is used.
X Mark Diode is not used.

■ SCHEMATIC DIAGRAM (SA-190 TUNER CIRCUIT SECTION)

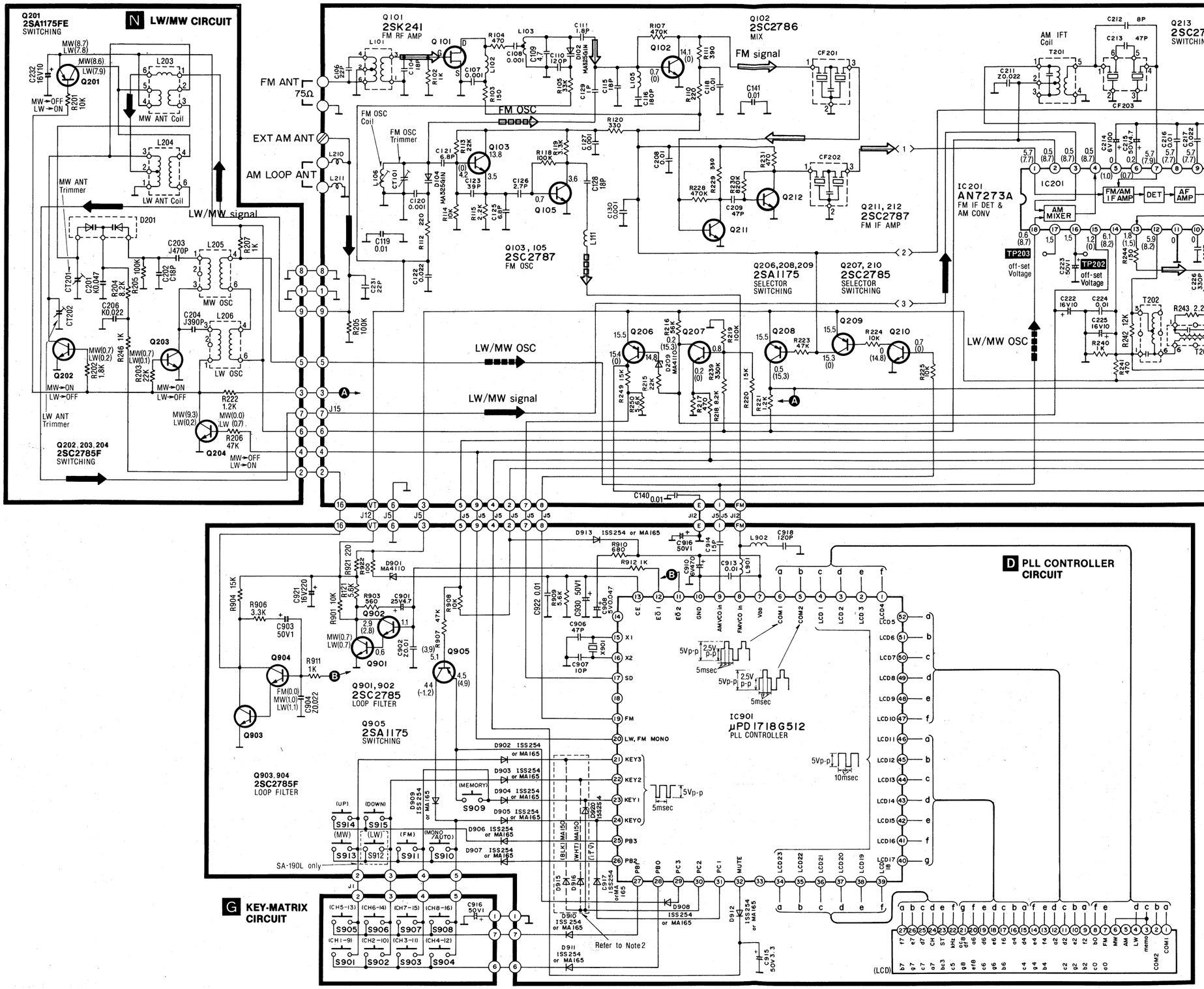
[EH, EX] areas only



SA-190 [XA, XL] areas only



(SA-190L TUNER CIRCUIT SECTION)



L EQUALIZER AMPLIFIER CIRCUIT

IC1
SVINJ4559DDM
EQUALIZER AMP

IC301
SVIμPC1161C3
MPX

Q213
2SC2785
SWITCHING

Q214
2SC2785
MUTING

Q703
2SC1685
REGULATOR

Q701
2SD1265
REGULATOR

Q702
2SC2785
REGULATOR

K MAIN CIRCUIT

IC601
STK4152-2M
2CH-POWER AMP

IC701
AN7072N
MUTING & PROTECTION

VOLUME CONTROL CIRCUIT

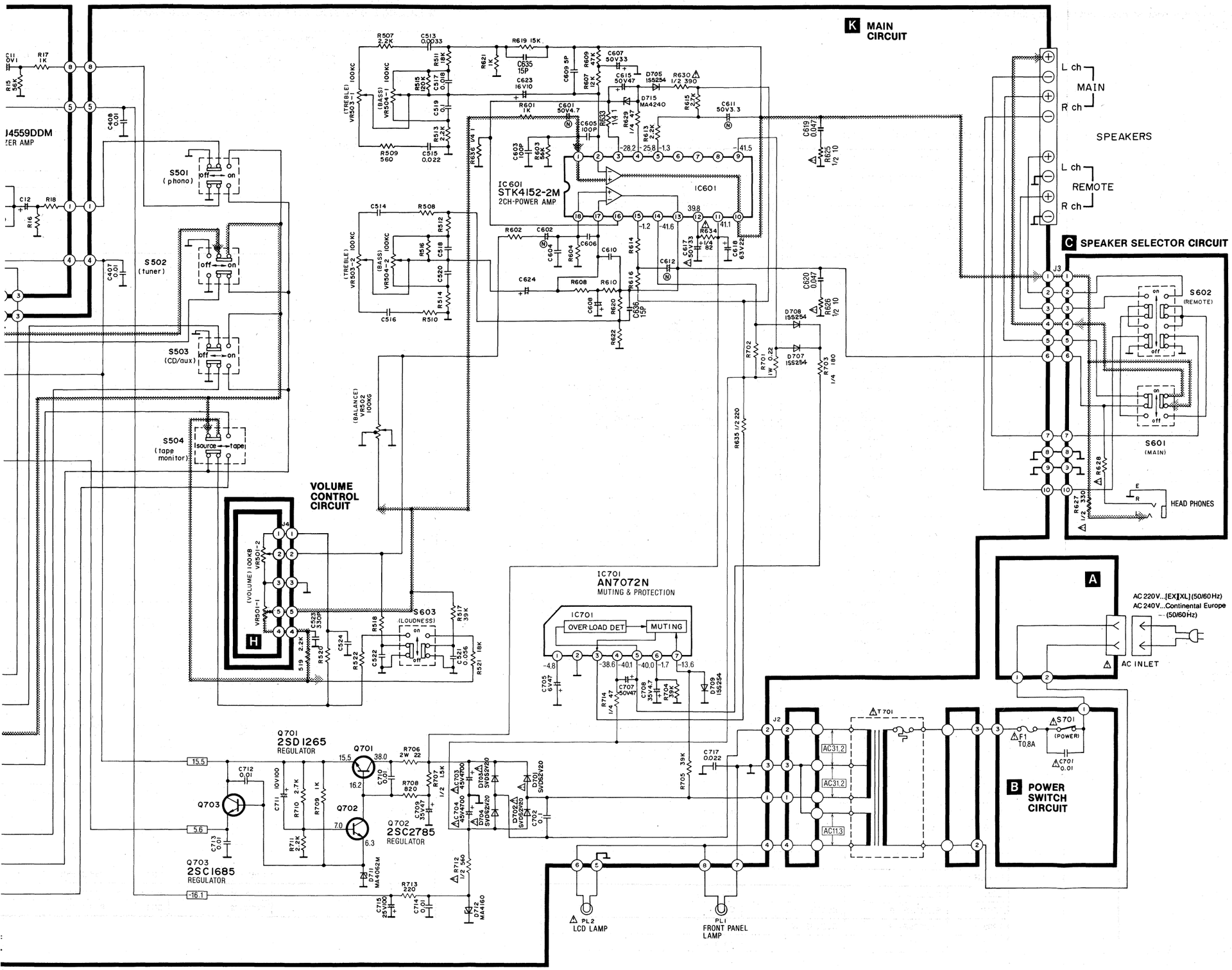
QUARTZ LOCK LED CIRCUIT

S501 (phone)
S502 (tuner)
S503 (CD/aux)
S504 (tape monitor)
S603 (LOUDNESS)

PHONO
CD/AUX
REC OUT
TAPE/EXT
PLAYBACK
(L ch)
(R ch)
GND

PL1 FRONT PANEL LAMP
PL2 LCD LAMP

12 13 14 15 16 17 18 19 20 21



■ SCHEMATIC DIAGRAM

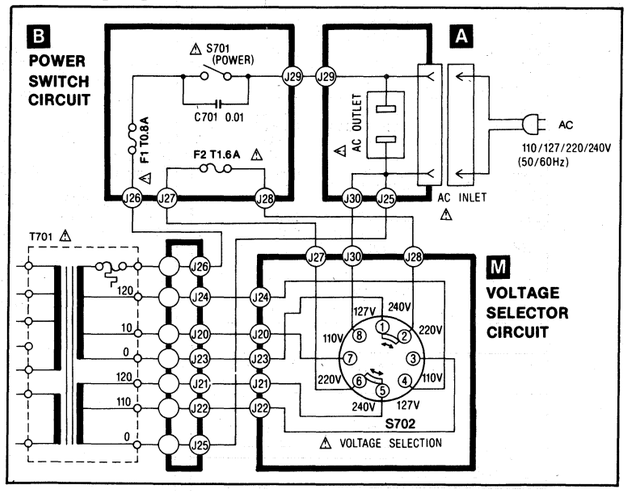
(This schematic diagram may be modified at any time with the development of new technology.)

*** Caution !**

IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

- * Cover the parts boxes made of plastics with aluminum foil.
- * Ground the soldering iron.
- * Put a conductive mat on the work table.
- * Do not touch the legs of IC or LSI with the fingers directly.

SA-190 [XA] area



SA-190/190L SA-190/190L

■ REPLACEMENT PARTS LIST

Notes:
- Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
- Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
- The "Ⓢ" mark is service standard parts and may differ from production parts.

● SA-190L [EF, EB, EK, EW]

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC1	SVINJ4559DDM	IC
IC201	AN7273A	IC
IC301	SVIμPC1161C3	IC
IC601 ⚠	STK4152−2M	IC
IC701 ⚠	AN7072N	IC
IC901	μPD1718G512	IC
TRANSISTORS		
Q101	2SK241GR	Transistor
Q102	2SC2786M	Transistor
Q103, 105	2SC2787L	Transistor
Q201, 206	2SA1175FE	Transistor
Q202～204, 207	2SC2785F	Transistor
Q208, 209	2SA1175FE	Transistor
Q210	2SC2785F	Transistor
Q211, 212	2SC2787L	Transistor
Q213, 214, 702	2SC2785F	Transistor
Q701	2SD12650	Transistor
Q703	2SC1685−S	Transistor
Q901～904	2SC2785F	Transistor
Q905	2SA1175FE	Transistor
DIODES		
D102, 104	MA325G−Y	Diode
D201	KV1260Z	Diode
D206	SLV31VC3	Diode
D207	1SS254	Diode
D209	MA4110M	Diode
D301, 303	1SS254	Diode
D701～704 ⚠	SVDS2V20	Rectifier
D705, 707～709	1SS254	Diode
D711	MA4062M	Diode
D712	MA4160M	Diode
D715 ⚠	MA4240M	Diode
D901	MA4110M	Diode
D902～913	1SS254	Diode
D915, 916	MA162A	Diode
D917, 920	1SS254	Diode
COILS		
L101	SLA4N39	Choke
L102	ELEPK1R2MA	Choke
L103	SLD4P87	Choke
L105	ELEPK1R2MA	Choke
L106	SLO4N27−P	Coil
L111	RLQY25S5−0	Choke
L203	SLA2B3−P	Coil
L204	SLA1B7R−P	Coil
L205	SLO2B9R−P	Coil
L206	SLO1B5−P	Coil
L210, 211	ELEPK1R0MA	Choke
L901	RLQY25S5−O	Choke
L902	ELEPK1R2MA	Choke
TRANSFORMERS		
T201	SLI2B101−M	Transformer
T202	SLI4B511−Z	Transformer
T203	SLI4B513−Z	Transformer
T701 [EK] only	SLT5M467	Transformer
T701 [other]	SLT5M466	Transformer
CERAMIC FILTERS		
CF201, 202	SVFE107MS8−A	FM, 10.7MHz (Red)
	SVFE107MS8−D	FM, 10.65MHz (Black)
	SVFE107MS8−E	FM, 10.75MHz (White)
CF203	SVFSFZ450F7L	AM, 450kHz

Ref. No.	Part No.	Description
CRYSTAL		
X901	SVQ49U452−T	Crystal 4.5MHz
VARIABLE RESISTORS		
VR301	QVNB3A00B472	Variable Resistor, 4.7kΩ
VR501	EWAPBAX05B15	Variable Resistor, 100kΩ(B)
VR502	EWANF5X05G15	Variable Resistor, 100kΩ(G)
VR503, 504	EWANA6X05C15	Variable Resistor, 100kΩ(C)
VARIABLE CAPACITORS		
CT101	ECRHA007A41	Variable Capacitor
CT201	ECRHA010A41	Variable Capacitor
CT202	ECRHA020D41	Variable Capacitor
COMPORNENT COMBINATIONS		
Z301, 302	EXRP181K473T	180pF, 47kΩ
SWITCHES		
S501, 502	SSH497	Phono, Tuner Selector
S503, 504	SSH497	CD/Aux, Tape Monitor Selector
S601, 602	SSH2108	Speaker Selector
S603	SSH1159	Loudness Selector
S701 ⚠	SSH1071	Power Source
S702 ⚠	ESE37263	Voltage Selector
S901～915	SSG13	Input Selector
FUSE		
F1 [EK] only ⚠	XBA2C08TB0	250V, T0.8A
F1 [other] ⚠	XBA2C08TR0	250V, T0.8A
LIQUID CRYSTAL DISPLAY		
LCD	SALHLC9225−3	Frequency Display
LAMPS		
PL1 ⚠	XAMR83S150A	Lamp
PL2 ⚠	XAMR78S150	Lamp

● SA-190L [EF, EB, EK, EW]

Ref. No.	Part No.	Description	
CABINET and CHASSIS PARTS			
1	SWV66	Indicator (with LED)	(1)
2	SBDA290−KM	Volume Knob	(1)
3	SGYA190L−KK	Front Panel Ass'y	(1)
3-1	SGU483L	Instruction Plate	(1)
3-2	SGB628−1	Badge	(1)
4	SBC571−10T	Speaker Button	(2)
5	SBC666−3	Power Source Button	(1)
6	SHG6380	Rubber	(1)
7	SGX7809	Lamp Holder Plate	(1)
8	SJT347	Fuse Holder	(2)
9	SHR9789	Volume Holder	(1)
10	SUX39	Shaft	(1)
11	SUW2974	Plate	(3)
12	SMC6395−1	Shield Plate	(2)
13	SHR9771−2	LCD Holder	(1)
14	SDU249−1	LCD Filter	(1)
15	SMP395−2	Lamp Case	(1)
16	SHR415	Nylon Pin	(2)
17	SUB251	Connection Rod	(4)
18	SKUA290−KC	Bottom Board Ass'y	(1)
18-1	SKL293	Foot	(4)
19	SHE185	P.C.B. Holder	(1)
20	SBC315−7	Loudness Knob	(1)
21	SHR5310	Tone Spacer	(1)
22	SKC1880K991	Cabinet	(1)
23	SBD97−3	Tone Selector Knob	(3)
24	SUW2928−1	Plate	(1)
25	SUW2975	Plate	(1)
26	SJF4818	Speaker Terminal	(1)
27	SJF3059−14N	Input Terminal	(1)
28	SJF4441−4	ANT Terminal	(1)
29 [EK]	SGP6703A	Rear Panel	(1)
29 [EW]	SGP6703B	Rear Panel	(1)
29 [EF, EB]	SGPA190L−KF	Rear Panel	(1)
30 ⚠	SJS9231B	AC Inlet	(1)
31	SJS9231A	AC Inlet Cover	(1)
34	SHR9748	P.C.B. Holder	(1)
35	SJJ126B	Headphone	(1)
37	SBC718−1	Selector Button	(4)
38	SHR9764−7	Spacer	(1)
39	SHR669−1	Spacer	(1)
41	SUW2013−1	Bracket	(1)
43	SJT30943−V	Socket (9P)	(1)

Ref. No.	Part No.	Description	
SCREWS			
N1	XTB3+8G	Tapping, ⊕3×8	(4)
N2	XTB3+8JFZ1	Tapping, ⊕3×8	(22)
N3	XTW3+8T	Tapping, ⊕3×8	(7)
N4	XTBS3+16F1	Tapping, ⊕3×16	(2)
N5	SNE2095−5	Cabinet	(2)
N6	SNE2117−1	Transistor	(1)
N7	SNE2118	Power IC	(2)
N8	XTBS3+8FFZ1	Tapping, ⊕3×8	(1)
N9	XTW3+8T	Tapping, ⊕3×8	(1)
N10	XTBS3+8JFZ1	Tapping, ⊕3×8	(1)
ACCESSORIES			
A1 [EK] ⚠	SFDAC05G02	AC Cord	(1)
A1 [EB] ⚠	SFDAC05E02	AC Cord	(1)
A1 ⚠ [other]	SFDAC05E03	AC Cord	(1)
A2	SSA270	FM Antenna	(1)
A3	SSA902−5	AM Antenna	(1)
A4	SMA231	Antenna Holder (B)	(1)
A5	SMA233−1	Antenna Holder (A)	(1)
A6	XTN3+10AFZ	Tapping, ⊕3×10	(1)
A8 [EK]	SJP9009	Adaptor (DIN)	(1)
A9	SQF12647	Instruction Book	(1)
PACKING PARTS			
P1 [EK]	SPG5527	Carton Box	(1)
P1 [EW, EB]	SPG5528	Carton Box	(1)
P1 [EF]	SPG5529	Carton Box	(1)
P2	SPS4433−3	Pad	(1)
P3	SPS4432−3	Pad	(1)
P4	SPS4670	Pad (Front)	(1)
P5	SPS4693	Pad (Upper)	(1)
P6	SPP719	Polyethylene Bag	(1)

● Change of Parts List (SA-190 from SA-190L)

Ref. No.	Change of Part No. SA-190L [EK]	Change of Part No. SA-190 [EX, EH, XL, XA]	Part Name & Description
TRANSISTORS			
Q201	2SA1175FE	———	(Deletion)
Q202～204	2SC2785F	———	(Deletion)
Q903, 904	2SC2785F	———	(Deletion)
DIODES			
D917	1SS254	———	(Deletion)
COILS			
L203	SLA2B3−P	———	(Deletion)
L204	SLA1B7R−P	SLA2B1−1M	Coil
L205	SLO2B9R−P	SLO2B7−M	Coil
L206	SLO1B5−P	———	(Deletion)

● Change of Parts List (SA-190 from SA-190L)

Ref. No.	Change of Part No. SA-190L [EK]	Change of Part No. SA-190 [EX, EH, XL, XA]	Part Name & Description
TRANSFORMERS			
T701	SLT5M467	SLT5M466 [EX, EH]	Power T
		SLT5M467 [XL]	Power T
		SLT5M468 [XA]	Power T
VARIABLE CAPACITOR			
CT202	ECRHA020D41	———	———
SWITCHES			
S702	———	ESE37263 [XA]	Voltage
S912	SSG13	———	———
FUSES			
F1	XBA2C08TB0	XBA2C08TR0	Fuse, 250V, T0.8A
F2	———	XBA2C16TR0 [XA] only	Fuse, 25
CABINET and CHASSIS PARTS			
3	SGYA190L−KK	SGYA190−KX	Front Panel Ass'y
3-1	SGU483L	SGU483G	Light Guide Panel
28	SJF4441−4	SJF4441−1 [XL, XA]	Antenna
		SJF4441−4 [EX, EH]	Antenna
29	SGP6703A	SGP6701A [EX]	Rear Pan
		SGPA190−KH [EH]	Rear Pan
		SGP6701B [XL]	Rear Pan
		SPG6702A [XA]	Rear Pan
30	SJS9231B	SJS9231B [EX, EH, XA]	AC Inlet
		SJS9234B [XL]	AC Inlet
31	SJS9231A	SJS9231A [EX, EH, XA]	AC Inlet
		SJS9234A [XL]	AC Inlet
32	———	SJS9232B [XA]	AC Outle
33	———	SJS9232A [XA]	AC Outle
40	———	SMX435 [XA] only	Insulatio
41	SUW2013−1	———	———
42	———	SJT347 [XA] only	Fuse Hol
SCREWS			
N9	XTW3+8T	———	———
N10	XTBS3+8JFZ1	———	———
N11	———	XYN3+C6FZ [XA] only	⊕3×6
ACCESSORIES			
A1	SFDAC05G02	SFDAC05E03 [EX, EH]	AC Cord
		SJA173 [XL]	AC Cord
		SJA168−1 [XA]	AC Cord
A2	SSA270	SSA269 [XL, XA]	FM Anten
		SSA270 [EX, EH]	FM Anten
A7	———	SJP9215 [XA]	Plug Adap
A8	SJP9009	———	———
A9	SQF12647	SQF12647 [EX, EH, XL]	Instructio
		SQF12648 [XA]	Instructio
PACKING PARTS			
P1	SPG5527	SPG5525 [EX, EH, XA]	Carton Bo
		SPG5526 [XL]	Carton Bo
P2	SPS4433−3	SPS4433−3 [EX, EH, XA]	Pad (Right
		SPS4433−1 [XL]	Pad (Right
P3	SPS4432	SPS4432−3 [EX, EH, XA]	Pad (Left)
		SPS4432−1 [XL]	Pad (Left)

Description	
g, ⊕3×8	(4)
g, ⊕3×8	(22)
g, ⊕3×8	(7)
g, ⊕3×16	(2)
	(2)
tor	(1)
C	(2)
g, ⊕3×8	(1)
g, ⊕3×8	(1)
g, ⊕3×8	(1)
d	(1)
d	(1)
d	(1)
enna	(1)
enna	(1)
a Holder (B)	(1)
a Holder (A)	(1)
g, ⊕3×10	(1)
r (DIN)	(1)
tion Book	(1)
Box	(1)
Box	(1)
Box	(1)
	(1)
	(1)
ont)	(1)
per)	(1)
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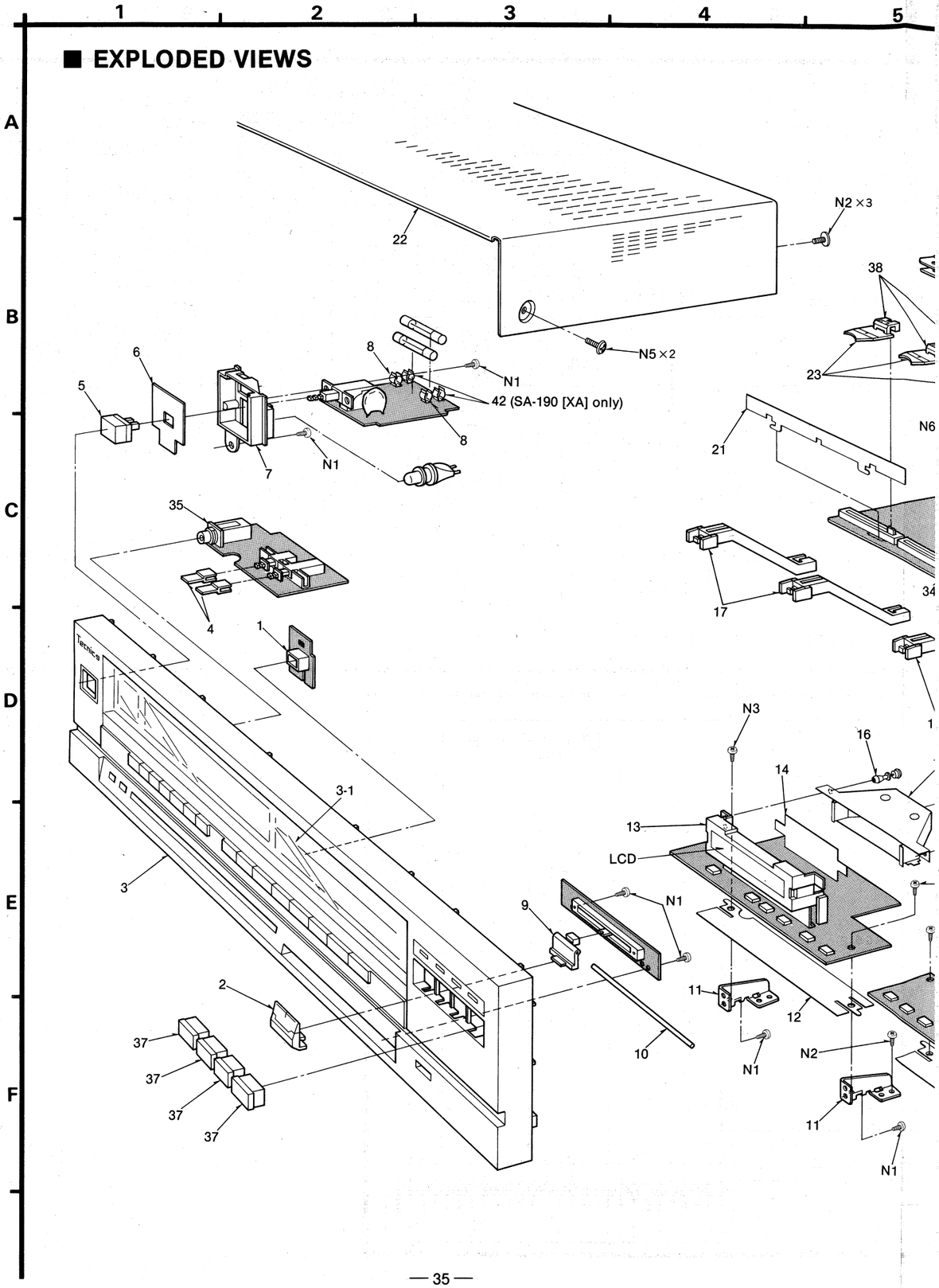
ption

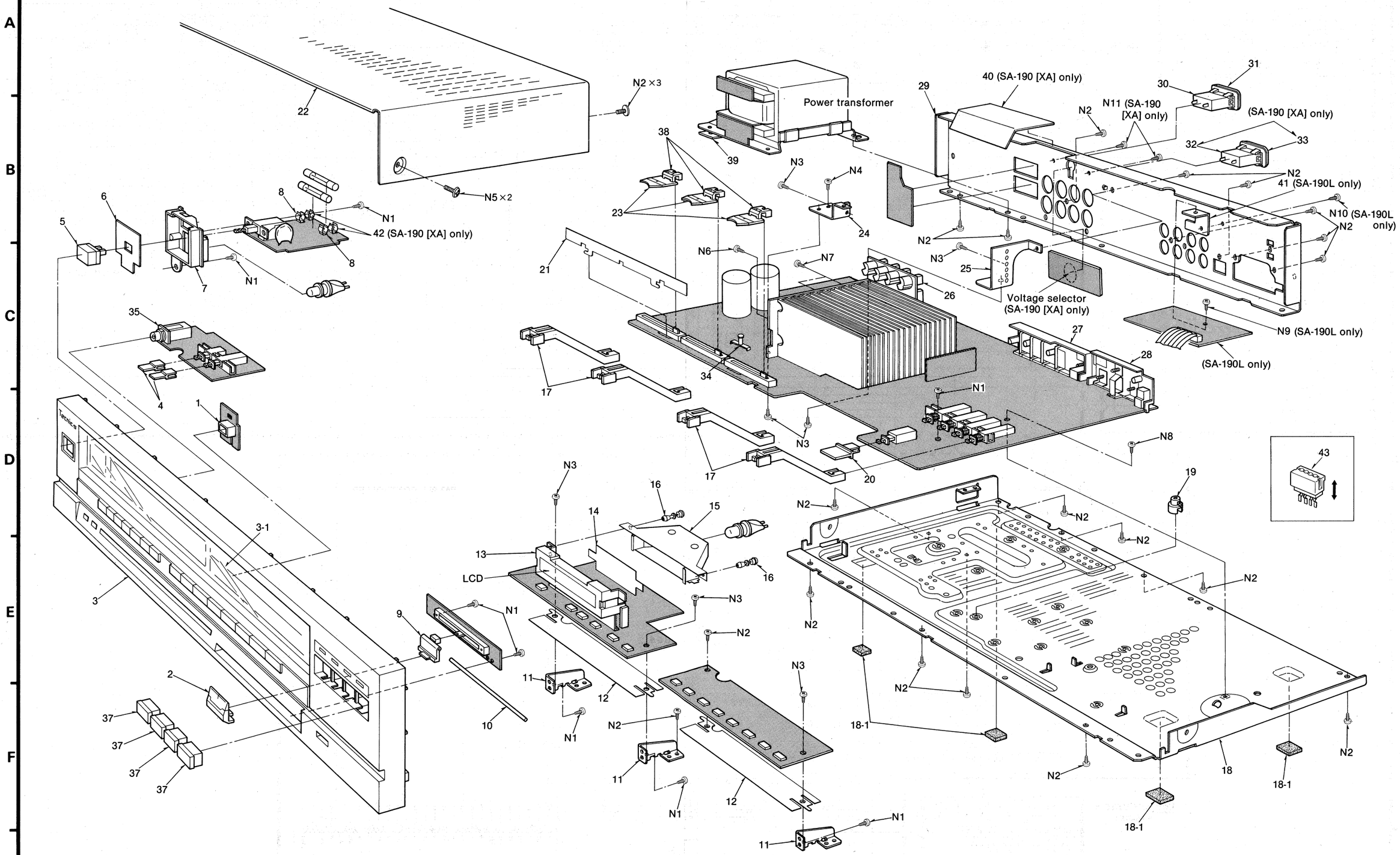
● Change of Parts List (SA-190 from SA-190L)

Ref. No.	Change of Part No. SA-190L [EK]	Change of Part No. SA-190 [EX, EH, XL, XA]	Part Name & Description	Pcs/Set	Remarks
TRANSFORMERS					
T701	SLT5M467	SLT5M466	[EX, EH] Power Transformer	(1)	⚠
		SLT5M467	[XL] Power Transformer	(1)	⚠
		SLT5M468	[XA] Power Transformer	(1)	⚠
VARIABLE CAPACITOR					
CT202	ECRHA020D41	———	———	—	(Deletion)
SWITCHES					
S702	———	ESE37263	[XA] Voltage Selector	(1)	(Addition) ⚠
S912	SSG13	———	———	—	(Deletion)
FUSES					
F1	XBA2C08TB0	XBA2C08TR0	Fuse, 250V, T0.8A	(1)	⚠
F2	———	XBA2C16TR0	[XA] only Fuse, 250V, T1.6A	(1)	(Addition) ⚠
CABINET and CHASSIS PARTS					
3	SGYA190L−KK	SGYA190−KX	Front Panel Ass'y	(1)	
〔3-1	〔SGU483L	〔SGU483G	Light Guide Panel	(1)	
28	SJF4441−4	SJF4441−1	[XL, XA] Antenna Terminal	(1)	
		SJF4441−4	[EX, EH] Antenna Terminal	(1)	
29	SGP6703A	SGP6701A	[EX] Rear Panel	(1)	
		SGPA190−KH	[EH] Rear Panel	(1)	
		SGP6701B	[XL] Rear Panel	(1)	
		SPG6702A	[XA] Rear Panel	(1)	
30	SJS9231B	SJS9231B	[EX, EH, XA] AC Inlet	(1)	⚠
		SJS9234B	[XL] AC Inlet	(1)	⚠
31	SJS9231A	SJS9231A	[EX, EH, XA] AC Inlet Cover	(1)	
		SJS9234A	[XL] AC Inlet Cover	(1)	
32	———	SJS9232B	[XA] AC Outlet	(1)	(Addition) ⚠
33	———	SJS9232A	[XA] AC Outlet Cover	(1)	(Addition)
40	———	SMX435	[XA] only Insulation Cover	(1)	(Addition)
41	SUW2013−1	———	———	—	(Deletion)
42	———	SJT347	[XA] only Fuse Holder	(2)	(Addition)
SCREWS					
N9	XTW3+8T	———	———	—	(Deletion)
N10	XTBS3+8JFZ1	———	———	—	(Deletion)
N11	———	XYN3+C6FZ	[XA] only ⊕3×6	(2)	(Addition)
ACCESSORIES					
A1	SFDAC05G02	SFDAC05E03	[EX, EH] AC Cord	(1)	⚠
		SJA173	[XL] AC Cord	(1)	⚠
		SJA168−1	[XA] AC Cord	(1)	⚠
A2	SSA270	SSA269	[XL, XA] FM Antenna	(1)	
		SSA270	[EX, EH] FM Antenna	(1)	
A7	———	SJP9215	[XA] Plug Adaptor	(1)	(Addition)
A8	SJP9009	———	———	—	(Deletion)
A9	SQF12647	SQF12647	[EX, EH, XL] Instruction Book	(1)	
		SQF12648	[XA] Instruction Book	(1)	
PACKING PARTS					
P1	SPG5527	SPG5525	[EX, EH, XA] Carton Box	(1)	
		SPG5526	[XL] Carton Box	(1)	
P2	SPS4433−3	SPS4433−3	[EX, EH, XA] Pad (Right)	(1)	
		SPS4433−1	[XL] Pad (Right)	(1)	
P3	SPS4432	SPS4432−3	[EX, EH, XA] Pad (Left)	(1)	
		SPS4432−1	[XL] Pad (Left)	(1)	

■ EXPLODED VIEWS



■ EXPLODED VIEWS



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ORDER NO. HAD8602345C8-A

QUARTZ Synthesizer
AM/FM Stereo Receiver
QUARTZ Synthesizer
LW/MW/FM Stereo Receiver

SA-190
SA-190L

DEUTSCH

- This booklet contains the specifications and adjusting procedures for SA-190L/SA-190, written in German, French and Spanish.
- File this manual together with the SA-190L/SA-190 service manual (Order No. HAD8602345C8).

- Das vorliegende Büchlein enthält die technische Daten und Justierverfahren für den SA-190L/SA-190 in deutscher, französischer und spanischer Sprache.
- Bewahren Sie das Büchlein zusammen mit der Bedienungsanleitung für des SA-190L/SA-190 auf (Bestell-Nr. HAD8602345C8).

- Cette brochure contient les spécifications et les procédures de mises au point pour le SA-190L/SA-190, écrites en allemand, en francais et en espagnol.
- Classer ce manuel en meme temps qu'avec le manuel de service du SA-190L/SA-190 (N° d'order: HAD8602345C8).

- Este librito contiene la especificaciones y procedimientos de ajuste para SA-190L/SA-190, escritos en alemán, francés y español.
- Guardar este manual juntamente con el manual de servico de SA-190L/SA-190 (Pedido N° HAD8602345C8).

DEUTSCH

■ TECHNISCHE DATEN

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 1 kHz	
beide Kanäle ausgesteuert	2 × 35W (8 Ω)
Gesamtklirrfaktor	
halbe Nennleistung bei 1 kHz	0,07% (8 Ω)
Intermodulationsfaktor	
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,5%
Leistungsbandbreite	
beide Kanäle ausgesteuert bei −3 dB	10 Hz ~ 40 kHz (8 Ω)
Dämpfungsfaktor	20 (8 Ω)
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
CD/AUX,TAPE/EXT	150 mV/22 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	150 mV
Geräuschspannungsabstand	
Nennleistung (8 Ω)	
Phono	70 dB (nach IHF, A: 72 dB)
CD/AUX,TAPE/EXT	88 dB (nach IHF, A: 95 dB)
Frequenzgang	
Phono	RIAA-Standardkurve, ±0,8 dB (30 Hz ~ 15 kHz)
CD/AUX,TAPE/EXT	10 Hz ~ 70 kHz(−3 dB)
Klangregler	
Baßregler (BASS)	50 Hz, +10 dB ~ −10 dB
Höhenregler (TREBLE)	20 kHz, +10 dB ~ −10 dB
Gehörrichtige Lautstärkekorrektur (Loudness)	
(bei −30 dB Ausgangsleistung)	50 Hz, +9 dB
Ausgangsspannung	
Aufnahmeausgang (REC OUT)	150 mV
Kanalabweichung (250 Hz ~ 6300 Hz)	±1 dB
Übersprechdämpfung (1 kHz)	55 dB
Kopfhörerpegel und -impedanz	390 mV/330 Ω
Lautsprecherimpedanz	
MAIN oder REMOTE	8 Ω ~ 16 Ω
MAIN und REMOTE	8 Ω ~ 16 Ω

■ UKW-TUNERTEIL

Wellenbereich	87,50 ~ 108,00 MHz
Eingangsempfindlichkeit	
S/R 30 dB	1,5 μV (75 Ω)
S/R 26 dB	1,3 μV (75 Ω)
S/R 20 dB	1,2 μV (75 Ω)
Nutzempfindlichkeit nach IHF	1,5 μV (nach IHF '58, 75 Ω)
Stereoumschaltschwelle bei 46 dB nach IHF	22 μV/75 Ω
Gesamtklirrfaktor	
Mono	0,15%
Stereo	0,3%
Geräuschabstand	
Mono	60 dB (75 dB nach IHF)
Stereo	58 dB (71 dB nach IHF)
Frequenzgang	20 Hz ~ 15 kHz (+1 dB ~ −2 dB)
Trennschärfe bei Störsender	±400 kHz, 65 dB
Einfangverhältnis	1,0 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	40 dB
ZF-Dämpfung bei 98 MHz	70 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	70 dB
MW-Unterdrückung	50 dB
Übersprechdämpfung	
1 kHz	40 dB
10 kHz	30 dB
Trägerrest	
19 kHz	−30 dB (−35 dB nach IHF)
38 kHz	−45 dB (−50 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±1,5 dB
Begrenzereinsatz	1,2 μV
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	75 Ω (unsymmetrisch)

■ MW-TUNERTEIL (SA-190)

Wellenbereiche	522 ~ 1611 kHz (9-kHz-Schritte) 530 ~ 1620 kHz (10-kHz-Schritte)
Eingangsempfindlichkeit (S/R 20 dB)	20 μV, 330 μV/m
Trennschärfe	55 dB
Spiegelfrequenz-Dämpfung	40 dB
ZF-Dämpfung	55 dB

■ MW-TUNERTEIL (SA-190L)

Wellenbereiche	
MW	522 ~ 1611 kHz (9-kHz-Schritte) 530 ~ 1620 kHz (10-kHz-Schritte)
LW	155 ~ 353 kHz (153 ~ 351 kHz, −2 kHz-Schaltung)
Eingangsempfindlichkeit (S/R 20 dB)	
MW	20 μV, 330 μV/m
LW	45 μV
Trennschärfe	
MW (bei 999 kHz)	55 dB
LW (bei 254 kHz)	55 dB
Spiegelfrequenz-Dämpfung	
MW (bei 999 kHz)	40 dB
LW (bei 254 kHz)	40 dB
ZF-Dämpfung	
MW (bei 999 kHz)	55 dB
LW (bei 254 kHz)	40 dB

■ ALLGEMEINE DATEN

Leistungsaufnahme	200 W
Netzspannung	
Für Kontinentaleuropa	Wechselstrom 50 Hz/60 Hz, 220V
Für andere Länder	Wechselstrom 50 Hz/60 Hz, 110V/127V/220V/240V
Abmessungen (B×H×T)	430 × 97 × 243 mm
Gewicht	4,5 kg

(Die technischen Daten können infolge von Verbesserungen ohne Ankündigung geändert werden.)

■ MESSUNGEN UND JUSTIERUNGEN

MW/UKW (SA-190)
LW/MW/UKW (SA-190L)

Einstellungen der Bedienelemente und zu verwendende Geräte.

- MW/UKW-Meßsender (MW/UKW-MS)
- Stereo-Modulator
- Verzerrungs-Analystator
- Oszilloskop
- Elektronische Wechselstrom- und Gleichstrom-Voltmeter (EVM)
- Frequenzzähler
- Drosselspule (100μH)
- Wiederstand (100kΩ)
- Keramischer Kondensator (200pF)

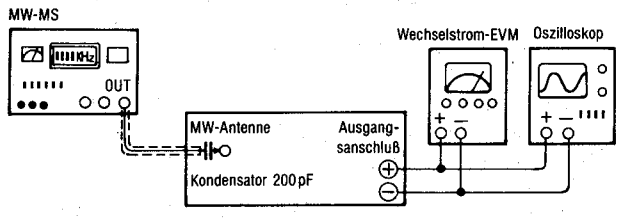
Anmerkung: Für **T201 (MW ZFT)** und **L205 (MW-OSZ,-Spule)**, werdeven justiert Ersatzteil geliefert. **(SA-190)**
Für **L204 (LW ZFT)** und **L205 (MW-OSZ,-Spule)**, werdeven justiert Ersatzteil geliefert. **(SA-190L)**
Dien Kern dieses Teils daher nicht drehen.

AM (MW)-HF-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "**AM (MW)**" einstellen.
3. Radio und Signalgenerator auf **610kHz** einstellen.
4. **L204** auf maximale Ausgangsleistung abgleichen. **(SA-190)**
4. **L203** auf maximale Ausgangsleistung abgleichen. **(SA-190L)**
5. Radio und Signalgenerator auf **1500kHz** einstellen.
6. **CT201** auf maximale Ausgangsleistung abgleichen.
7. Die Schritte 3.~6. wiederholen.

Anmerkung:
Der Antenneneingang-Signalpegel muß so niedrig wie möglich und frei von automatischer Verstärkungsregelung (AGC) sein.

ZUSTAND DES MW-MESSENDERS
Modulation 30%
Modulations frequenz 400Hz

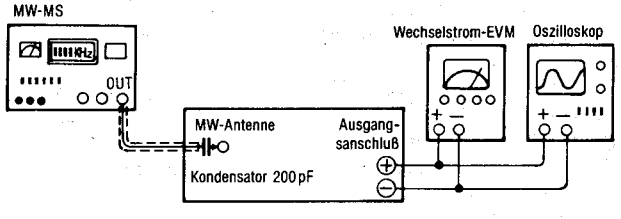


LW-HF-JUSTIERUNG (Nur SA-190L)

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "**LW**" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf **155kHz** einstellen.
4. **L206** auf maximale Ausgangsleistung abgleichen.
5. Die Radiofrequenzanzeige und den Meßsender auf **353kHz** einstellen.
6. **CT202** auf maximale Ausgangsleistung abgleichen.
7. Die Schritte 3.~6. wiederholen.

Anmerkung:
Der Antenneneingang-Signalpegel muß so niedrig wie möglich und frei von automatischer Verstärkungsregelung (AGC) sein.

ZUSTAND DES MW-MESSENDERS
Modulation 30%
Modulations frequenz 400Hz



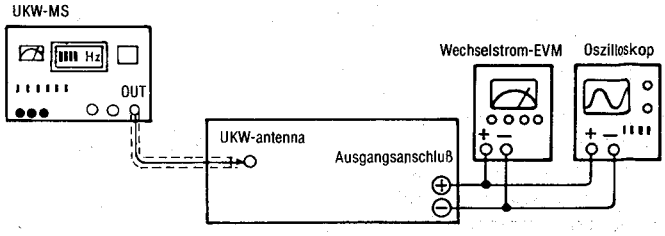
UKW-HF-JUSTIERUNG

1. Testausrüstung wie gezeigt anschließen.
2. Gerät auf FM stellen.
3. Radio und Signalgenerator auf **90,10 MHz** einstellen.
4. **L106** für maximalen Ausgang einstellen.
5. Radio und Signalgenerator auf **106,10 MHz** einstellen.
6. **CT101** für maximalen Ausgang einstellen.
7. Schritte 3.~6. wiederholen.

HINWEIS:

Alle drei Ausgang-Anzeigen sind vorhanden, die Einstellungen müssen mit der Mittenfrequenz erfolgen.

ZUSTAND DES UKW-MESSENDERS
Modulation 100%
Modulations frequenz ..... 400 Hz
Ausgangspegel ..... 66 dB



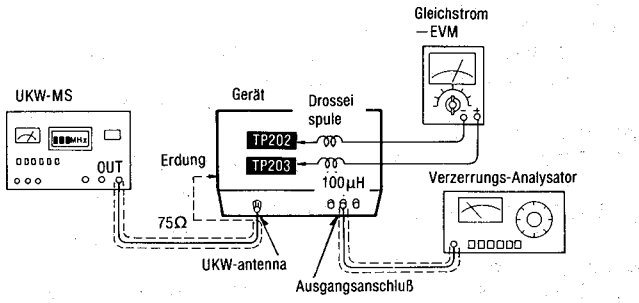
UKW-MONO-VERZERRUNGS-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "**FM (UKW)**" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf **100.10 MHz** einstellen.
4. Den Kern von **T202** so justieren, daß die im Signalzustand gemessene Spannung **0 mV (0±20 mV)** im 1 V-Bereich beträgt. **(SA-190)**
4. **T203** so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird. **(SA-190L)**
5. Schritte 4 und 5 einige Male wiederholen.
6. Überprüfen, daß die Verzerrungsfaktor des linken und rechten Kanals fast gleich sind.

Anmerkung:

Für die Justierung ist ein Schraubendreher aus Kunststoff zu verwenden.

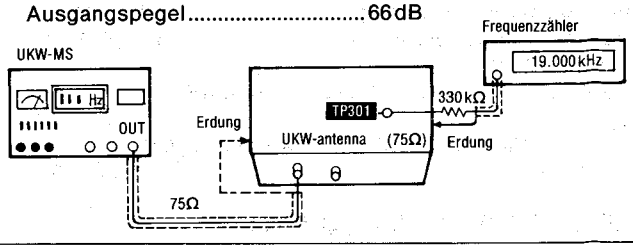
ZUSTAND DES UKW-MESSENDERS
Modulation 100%
Modulations frequenz ..... 400 Hz
Ausgangspegel ..... 72 dB



UKW-STEREO-JUSTIERUNG (FREILAUDEND)

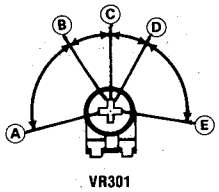
1. Der Testaufbau ist in der Abbildung gezeigt.
2. Den UKW-Bertriebsart-Wahlschalter indie "**FM/auto**"-Position stellen.
3. Radio und Meßsender auf **100,10 kHz** einstellen.
4. **VR301** auf **19 kHz±30 Hz** auf der Frequenzzähleranzeige justieren.

ZUSTAND DES UKW-MESSENDERS
Modulation 0%
Modulations frequenz ..... 0 Hz
Ausgangspegel ..... 66 dB



VERWENDUNG EINES ALTERNATIVSYSTEMS

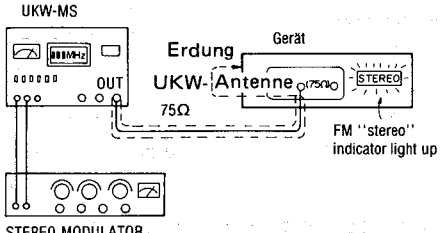
1. Stereosignal vom Meßsender eingeben oder eine Stereo-Sendung empfangen.
2. **VR301** justieren, bis die Stereo-Anzeige aufleuchtet. Den Arm von **VR301** mit Lack sichern, wie in der Abbildung gezeigt.



VR301

Ⓐ—Ⓑ, Ⓓ—Ⓔ : Stereo AUS Position
Ⓑ—Ⓓ : Stereo EIN Position (Anzeige leuchtet)
Ⓒ : Punktder Pilorschaltung justieren

ZUSTAND DES UKW-MESSENDERS
Modulation 10%
Modulations frequenz ..... 19 kHz
Ausgangspegel ..... 66 dB



STEREO MODULATOR
Pilotsignal auf ON ..... 19 kHz
Ausgangs-Betriebsart ..... L+R

FRANÇAIS

■ CARACTERISTIQUES

(DIN 45 500)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue à 1 kHz	
les deux canaux en circuit	2 × 35W (8Ω)
Distorsion harmonique totale	
à demi-puissance (1 kHz)	0,07% (8Ω)
Distorsion d'intermodulation	
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,5%
Réponse de fréquences	
les deux canaux en circuit, −3 dB	10 Hz~40 kHz (8Ω)
Coefficient d'amortissement	20 (8Ω)
Sensibilité et impédance d'entrée	
PHONO	2,5 mV/47kΩ
AUX, BANDE (CD/AUX,TAPE/EXT)	150 mV/22kΩ
PHONO (tension d'entrée maximum, 1 kHz RMS)	150 mV
Signal/Bruit	
à puissance nominale (8Ω)	
PHONO	70 dB (IHF, A: 72 dB)
AUX, BANDE (CD/AUX,TAPE/EXT)	88 dB (IHF, A: 95 dB)
Réponse de fréquence	
PHONO	Courbe nominale RIAA ±0,8 dB (30 Hz~15 kHz)
AUX, BANDE (CD/AUX,TAPE/EXT)	10 Hz~70 kHz (−3 dB)
Réglage de la tonalité	
BASSES (BASS)	50 Hz, +10 dB~−10 dB
AIGUS (TREBLE)	20 kHz, +10 dB~−10 dB
Compensateur physiologique (volume à −30 dB)	50 Hz, +9 dB
Tension de sortie	
SORTIE ENREGISTREMENT (REC OUT)	150 mV
Equilibrage des canaux, 250 Hz~6 300 Hz	±1 dB
Séparation des canaux, 1 kHz	55 dB
Niveau de sortie des casques et impédance	390 mV/330Ω
Impédance de charge	
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE)	8Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE)	8Ω~16Ω

■ SECTION SYNTONISATEUR FM

Gamme de fréquence	87,50~108,00 MHz
Sensibilité	
S/B 30 dB	1,5 μV (75Ω)
S/B 26 dB	1,3 μV (75Ω)
S/B 20 dB	1,2 μV (75Ω)
Sensibilité utilisable IHF	1,5 μV (IHF '58, 75Ω)
Sensibilité stéréo au seuil de 46 dB, IHF	22 μV/75Ω
Distorsion harmonique totale	
MONO	0,15%
STEREO	0,3%
Signal/Bruit	
MONO	60 dB (75 dB, IHF)
STEREO	58 dB (71 dB, IHF)
Réponse de fréquence	20 Hz~15 kHz, +1 dB~−2 dB
Sélectivité alternée par canal	±400 kHz, 65 dB
Taux de capture	1,0 dB
Rejection d'image à 98 MHz	40 dB
Rejection FI à 98 MHz	70 dB
Rejection de réponse parasite à 98 MHz	70 dB
Suppression AM	50 dB
Séparation stéréophonique	
1 kHz	40 dB
10 kHz	30 dB
Fuite de porteuse	
19 kHz	−30 dB (−35 dB, IHF)
38 kHz	−45 dB (−50 dB, IHF)
Equilibrage de canaux (250 Hz~6,300 Hz)	±1,5 dB
Point de limite	1,2 μV
Largeur de bande	
Amplificateur FI	180 kHz
Démodulateur FM	1000 kHz
Bornes d'antenne	75Ω (asymétrique)

■ SECTION SYNTONISATEUR AM (SA-190)

Gamme de fréquence	522~1611 kHz (par palier 9 kHz) 530~1620 kHz (par palier 10 kHz)
Sensibilité (S/B 20 dB)	20 μV, 330 μV/m
Sélectivité	55 dB
Réjection d'image à 999 kHz	40 dB
Réjection FI à 999 kHz	55 dB

■ SECTION SYNTONISATEUR AM (SA-190L)

Gamme de fréquence	
PO (MW)	522~1611 kHz (par palier 9 kHz) 530~1620 kHz (par palier 10 kHz)
GO (LW)	155~353 kHz (153~351 kHz; glissement de 2 kHz)
Sensibilité (S/B 20 dB)	
PO (MW)	20 μV, 330 μV/m
GO (LW)	45 μV
Sélectivite	
PO (MW) (à 999 kHz)	55 dB
GO (LW) (à 254 kHz)	55 dB
Réjection d'image	
PO (MW) (à 999 kHz)	40 dB
GO (LW) (à 254 kHz)	40 dB
Réjection FI	
PO (MW) (à 999 kHz)	55 dB
GO (LW) (à 254 kHz)	40 dB

■ DIVERS

Consommation	200W
Alimentation	
Pour l'Europe	CA 50 Hz/60 Hz, 220V
Autres	CA 50 Hz/60 Hz, 110V/127V/220V/240V
Dimensions (L×H×Pr)	430 × 97 × 243mm
Poids	4,5 kg

(Sujet à changement sans préavis)

■ MESURAGES ET REGLAGES

A.M./M.F. (SA-190)
LW/A.M./M.F. (SA-190L)

Positionnements des commandes et équipement utilisé

- MW/Générateur de signaux M.F. et A.M. (AM et FM-SG)
- Modulateur stéréophonique
- Analyseur de distorsion
- Oscilloscope
- Voltmètre électronique à C.A. et C.C. (EVM)
- Compteur de fréquence
- Bobine d'amortissement d'arrêt (100µH)
- Résistance (100kΩ)
- Condensateur céramique (200pF)

Nota: Pour **T201 (MA-Trans. de fréq)** et **L205 (bobine Oscil. de MA)** des éléments réglés sont fournis. (SA-190)
Pour **L204 (LW-Transf. de fréq)** et **L205 (bobine Oscil. de MA)** des éléments réglés sont fournis. (SA-190L)
Aussi, ne pas tourner les noyaux de ces piecès.

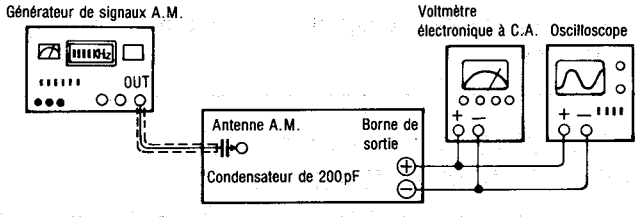
REGLAGE DE O.M.-H.F.

1. Le raccordement de l'équipement d'essai est montré sur l'illustration.
2. Régler l'appareil sur la position "**AM (MW)**".
3. Régler le cadran radio et le générateur de signaux sur **610kHz**.
4. Régler **L204** pour une sortie maximale. **(SA-190)**
4. Régler **L203** pour une sortie maximale. **(SA-190L)**
5. Régler le cadran radio et le générateur de signaux sur **1500kHz**.
6. Régler **CT201** pour une sortie maximale.
7. Répéter les étapes 3.~6.

Nota:

Le niveau d'entrée d'antenne doit être aussi bas que possible étant libéré de la commande automatique de gain.

CONDITION DU GENERATEUR DE SIGNAUX A.M.
Modulation 30%
Fréquence de modulation 400Hz



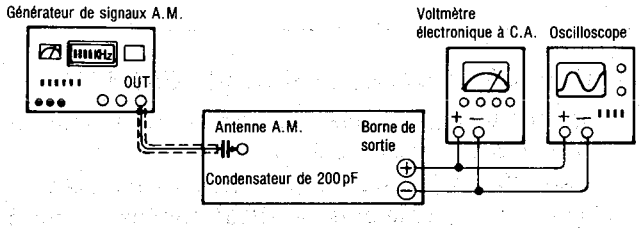
REGLAGE DE G.O.-H.F. (SA-190L seulement)

1. Le raccordement de l'équipement d'essai est montré sur l'illustration.
2. Régler l'appareil sur la position "**LW**".
3. Ajuster le réglage de l'affichage de radiofréquence et du générateur de signaux sur **155kHz**.
4. Régler **L206** pour une sortie maximale.
5. Ajuster le réglage de l'affichage de radiofréquence et du générateur de signaux sur **353kHz**.
6. Régler **CT202** pour une sortie maximale.
7. Répéter les étapes 3.~6.

Nota:

Le niveau d'entrée d'antenne doit être aussi bas que possible étant libéré de la commande automatique de gain.

CONDITION DU GENERATEUR DE SIGNAUX A.M.
Modulation 30%
Fréquence de modulation 400Hz



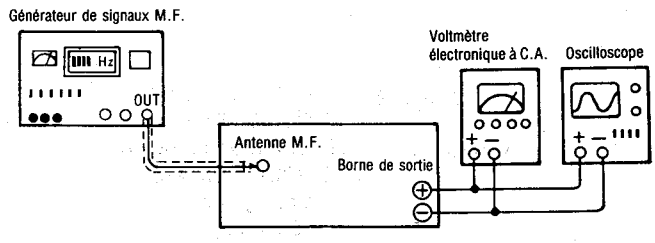
REGLAGE DE F.M.-H.F.

1. Le raccordement de l'équipement d'essai est indiqué à la figure.
2. Mettre l'appareil sur la position FM.
3. Régler le cadran radio et le générateur de signaux sur **90,10MHz**.
4. Régler **L106** pour obtenir une sortie maximale.
5. Régler le cadran radio et le générateur de signaux sur **106,10MHz**.
6. Régler **CT101** pour obtenir une sortie maximale.
7. Répéter la marche à suivre 3.~6.

Remarque:

Les réglages doivent être effectués sur la fréquence médiane étant donné que l'on a trois indications de sortie.

CONDITION DU GENERATEUR DE SIGNAUX M.F.
Modulation 100%
Fréquence de modulation 400Hz
Niveau de sortie 66dB



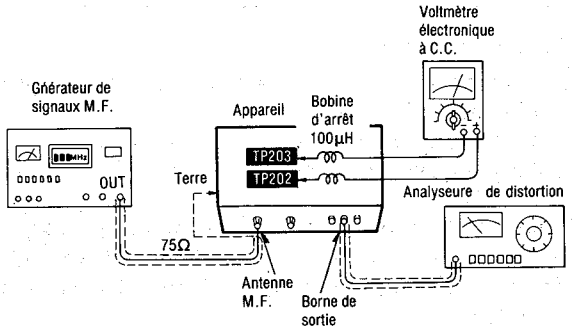
REGLAGE DE DISTORSION MONOPHONIQUE M.F.

1. Le raccordement de l'équipement d'essai est montré sur l'illustration.
2. Régler l'appareil sur la position "**FM**" (M.F.).
3. Ajuster le réglage de l'affichage de radiofréquence et du générateur de signaux sur **100.10MHz.**
4. Régler le noyau de **T202** de telle sorte que la tension mesurée sur le mode de signaux soit de **0mV (0±20mV)** dans une plage de 1V. **(SA-190)**
4. Ajuster **T203** de telle que le facteur de distorsion du canal de gauche soit minimisé. **(SA-190L)**
5. Répéter les étapes 4 et 5 quelques fois.
6. Sássurer que les facteurs de distorsion du canal de gauche et du canal de droite soient sensiblement les mêmes l'un par rapport à l'autre.

Nota:

Le tournevis de réglage utilisé devra être fait en résines.

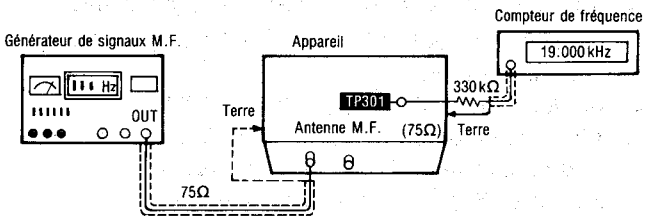
CONDITION DU GENERATEUR DE SIGNAUX M.F.
Modulation 100%
Fréquence de modulation 400Hz
Niveau de sortie 72dB



REGLAGE DE STEREO F.M. (FONCTIONNEMENT LIBRE)

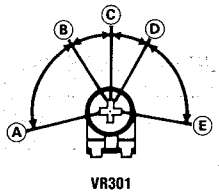
1. Le raccordement de l'équipement d'essai est montré sur la figure.
2. Régler l'appareil sur la position "**FM/auto**".
3. Régler le cadran radio et le générateur de signaux sur **100,10MHz.**
4. Ajuster **VR301** pour **19kHz±30Hz** sur le compteur de lecture de fréquences.

CONDITION DU GENERATEUR DE SIGNAUX M.F.
Modulation 0%
Fréquence de modulation 0Hz
Niveau de sortie 60dB



EN UTILISANT UN SYSTEME ALTERNATIF

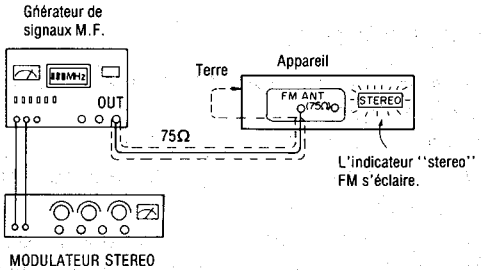
1. Applique un signal stéréo à partir du générateur ou recevoir une émission stéréo.
2. Ajuster **VR301** jusqu'à ce que l'indicateur stéréo s'éciaire. Coller le bras de **VR301** comme il montré sur la figure.



VR301

Ⓐ−Ⓑ, Ⓓ−Ⓔ : Position de HORS CIRCUIT "Stéréo".
Ⓑ−Ⓓ : Position de MISE EN CIRCUIT "Stéréo". (Eclairage de l'indicateur)
Ⓒ : Point de réglage du circuit pilote.

CONDITION DU GENERATEUR DE SIGNAUX M.F.
Modulation 10%
Fréquence de modulation ..... Pilote (19kHz)
Niveau de sortie 66dB



MODULATEUR STEREO
Signal pilote sun "ON" (mise en circuit) 19kHz
Mode de sortie ..... Gauche+Droite

ESPAÑOL

■ ESPECIFICACIONES

(DIN 45 500)

■ SECCION AMPLIFICADOR

Potencia continua de 1 kHz en ambos canales	2 × 35W (8Ω)
Distorsión armónica total mitad de potencia a 1 kHz	0,07% (8Ω)
Distorsión por intermodulación potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,5%
Ancho de banda de potencia con ambos canales, −3 dB	10 Hz~40 kHz (8Ω)
Factor de amortiguamiento	20 (8Ω)
Sensibilidad e impedancia de entrada	
TOCADISC. (PHONO)	2,5 mV/47kΩ
AUX. (CD/AUX, TAPE/EXT)	150 mV/22kΩ
Voltaje máximo de entrada de PHONO (1 kHz, RMS)	150 mV
Relación de señal a ruido potencia de régimen (8Ω)	
TOCADISC. (PHONO)	70 dB (IHF, A: 72 dB)
AUX., GRAB. (CD/AUX, TAPE/EXT)	88 dB (IHF, A: 95 dB)
Respuesta de frecuencia	
TOCADISC. (PHONO)	curva RIAA estándar ±0,8 dB (30 Hz~15 kHz)
AUX., GRAB. (CD/AUX, TAPE/EXT)	10 Hz~70 kHz (−3 dB)
Controles de tono	
BAJOS (BASS)	50 Hz, +10 dB~−10 dB
AGUDOS (TREBLE)	20 kHz, +10 dB~−10 dB
Control de sonoridad (volumen a −30 dB)	50 Hz, +9 dB
Voltaje de salida	
SAL. GRAB. (REC OUT)	150 mV
Equilibrio de canales, 250 Hz~6 300 Hz	±1 dB
Separación de canales, 1 kHz	55 dB
Impedancia y nivel de salida de los auriculares	390 mV/330Ω
Impedancia de carga	
MAIN o REMOTE	8Ω~16Ω
MAIN y REMOTE	8Ω~16Ω

■ SECCION PARA SINTONIZADOR FM

Gama de frecuencias	87,50~108,00 MHz
Sensibilidad	
Señal a ruido 30 dB	1,5 μV (75Ω)
Señal a ruido 26 dB	1,3 μV (75Ω)
Señal a ruido 20 dB	1,2 μV (75Ω)
Sensibilidad utilizable IHF	1,5 μV (IHF '58, 75Ω)
Sensibilidad de acallamiento estéreo de 46 dB IHF	22 μV/75Ω
Distorsión armónica total	
MONO. (MONO)	0,15%
ESTEREO (STEREO)	0,3%
Relación de señal a ruido	
MONO. (MONO)	60 dB (75 dB, IHF)
ESTEREO (STEREO)	58 dB (71 dB, IHF)
Respuesta de frecuencia	20 Hz~15 kHz, +1 dB~−2 dB
Selectividad alternada de canal	±400 kHz, 65 dB
Relación de captura	1,0 dB
Rechazo de imagen a 98 MHz	40 dB
Rechazo de F.I. a 98 MHz	70 dB
Rechazo de respuesta espuria a 98 MHz	70 dB
Supresión AM	50 dB
Separación estereofónica	
1 kHz	40 dB
10 kHz	30 dB
Fuga de onda portadora	
19 kHz	−30 dB (−35 dB, IHF)
38 kHz	−45 dB (−50 dB, IHF)
Equilibrio de canales 250 Hz~6 300 Hz	±1,5 dB
Punto de límite	1,2 μV
Ancho de banda	
Amplificador FI	180 kHz
Demodulador FM	1000 kHz
Bornes de antena	75Ω (no equilibrado)

■ SECCION PARA SINTONIZADOR AM (SA-190)

Gama de frecuencias	522~1611 kHz (9 kHz pasos) 530~1620 kHz (10 kHz pasos)
Sensibilidad (Relación de señal a ruido de 20 dB)	20 μV, 330 μV/m
Selectividad	55 dB
Rechazo de imagen a 999 kHz	40 dB
Rechazo de F.I. a 999 kHz	55 dB

■ SECCION PARA SINTONIZADOR AM (SA-190L)

Gama de frecuencias	
OM (MW)	522~1611 kHz (9 kHz pasos) 530~1620 kHz (10 kHz pasos)
OL (LW)	155~353 kHz (153~351 kHz; desviación de −2 kHz)
Sensibilidad (Relación de señal a ruido de 20 dB)	
OM (MW)	20 μV, 330 μV/m
OL (LW)	45 μV
Selectividad	
OM (MW) (a 999 kHz)	55 dB
OL (LW) (a 254 kHz)	55 dB
Rechazo de imagen	
OM (MW) (a 999 kHz)	40 dB
OL (LW) (a 254 kHz)	40 dB
Rechazo de F.I.	
OM (MW) (a 999 kHz)	55 dB
OL (LW) (a 254 kHz)	40 dB

■ GENERAL

Consumo de energía	200W
Alimentación de energía	
Para Europa continental	CA 50 Hz/60 Hz, 220V
Para otros paises	CA 50 Hz/60 Hz, 110V/127V/220V/240V
Dimensiones (An.×Al.×Prof.)	430 × 97 × 243 mm
Peso	4,5 kg

(Estas especificationes están sujetas a cualquier cambio sin previo eviso.)

■ MEDICIONES Y AJUSTES

AM/FM (SA-190)
LW/MW/FM (SA-190L)

Posiciones de control y equipo usado

- Generador de señales de AM y FM (AM & FM-SG)
- Modulador estéreo
- Analizador de distorsiones
- Osciloscopio
- Voltímetro electrónico de CA y CC (EVM)
- Frecuencimetro
- Bobina de choque (100μH)
- Resistor (100kΩ)
- Capacitor cerámico (200pF)

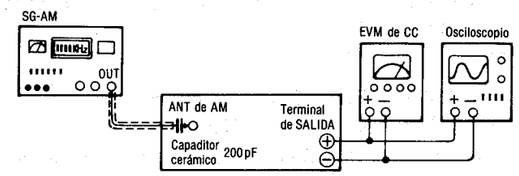
Nota: Para **T201 (AM-IFT)** y **L205 (bobina de OSC. AM)** son suministradas piezas ajustadas. (SA-190)
Para **L204 (LW-IFT)** y **L205 (bobina OSC. AM)** son suministradas piezas ajustadas. (SA-190L)
Por lo tanto, no gire los núcleos de estas piezas.

AJUSTE DE OM (MW)-RF

1. La conexión del equipo de pruebas se muestra en la figura.
2. Ajustar la unidad a la posición "**AM (MW)**".
3. Poner el indicador de la radio y el generador de señales en **610kHz**.
4. Ajuste **L204** para salida máxima. **(SA-190)**
4. Ajuste **L203** para salida máxima. **(SA-190L)**
5. Poner el indicador de la radio y el generador de señales en **1500kHz**.
6. Ajuste **CT201** para salida máxima.
7. Repita los pasos 3.~6.

Nota:
El nivel de entrada de antena ha de ser lo más bajo posible estando libre de AGC (control automático de ganancia).

CONDICION DE GENERADOR DE SEÑALES DE AM
Modulación 30%
Frecuencia de modulación 400Hz

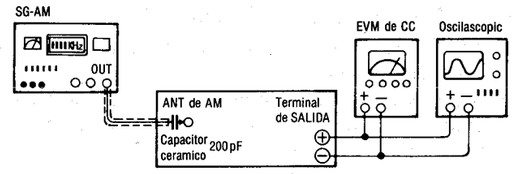


AJUSTE DE LO-RF (Sólo SA-190L)

1. La conexión del equipo de pruebas se muestra en la figura.
2. Ajustar la unidad a la posición "**LW**".
3. Poner el indicador de la radio y el generador de señales en **145kHz**.
4. Ajuste **L206** para salida máxima.
5. Poner el indicador de la radio y el generador de señales en **350kHz**.
6. Ajuste **CT202** para salida máxima.
7. Repita los pasos 3.~6.

Nota:
El nivel de entrada de antena ha de ser lo más bajo posible estando libre de AGC (control automático de ganancia).

CONDICION DE GENERADOR DE SEÑALES DE AM
Modulación 30%
Frecuencia de modulación 400Hz

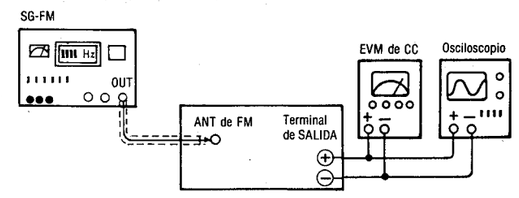


AJUSTE FM-RF

1. La conexión del equipo de pruebas se muestra en la figura.
2. Poner la unidad en la posición FM.
3. Poner el indicador de la radio y el generador de señales en **90,10MHz**.
4. Ajustar **L106** para la máxima salida.
5. Poner el indicador de la radio y el generador de señales en **106,10MHz**.
6. Ajustar **CT101** para la máxima salida.
7. Repetir los pasos 3. al 6.

Nota:
Como estarán presentes tres indicaciones de salida, los ajustes deben efectuarse en la frecuencia central.

CONDICION DE GENERADOR DE SEÑALES DE FM
Modulación 100%
Frecuencia de modulación 400Hz
Nivel de salida 66dB



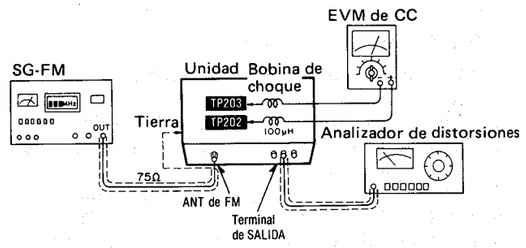
AJUSTE DE DISTORSION MONO FM

1. La conexión del equipo de pruebas se muestra en la figura.
2. Ajustar la unidad a la posición "**FM**".
3. Colocar la puesta del indicador de radiofrecuencia y generador de señales a **100,10 MHz**.
4. Ajustar el nucléo de **T202** de manera que el voltaje medido en modalidad de señal sea **0 mV (0±20 mV)**. **(SA-190)**
4. Ajustar **T203** de manera que el factor de distorsión de CH I se minimice. **(SA-190L)**
5. Repetir los pasos 4 y 5 algunas veces.
6. Asegurarse de que los factores de distorsión de CH I y CH D sean casi los mismos uno con el otro.

Nota:

El destornillador de ajuste usado debe estar hecho de resina.

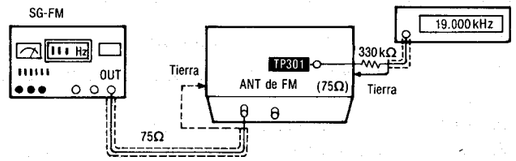
CONDICION DE GENERADOR DE SEÑALES DE FM
Modulación 100%
Frecuencia de modulación ..... 400 Hz
Nivel de salida ..... 72 dB



AJUSTE ESTEREOFONICA DE FM (FUNCIONAMIENTO LIBRE)

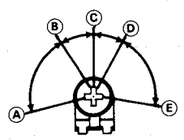
1. La conexión del equipo de prueba se muestra en la figura.
2. Poner la unidad en la posición de "**FM/auto**".
3. Coloque el indicador de la radio y la puesta del generador de señales en **100,10 MHz**.
4. Ajuste **VR301** para **19 kHz±30 Hz** en lectura de frecuencímetro.

CONDICION DE GENERADOR DE SEÑALES DE FM
Modulación ..... 0% (mon-modulation)
Frecuencia de modulación ..... 0 Hz
Nivel de salida ..... 60 dB



USANDO SISTEMA ALTERNATIVO

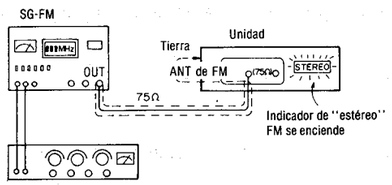
1. Aplique señal estereofónica del generador o reciba la emisión estereofónica.
2. Ajuste **VR301** hasta que el indicador de estéro se encienda. Cemente brazo de **VR301** como se muestra en la figura.



VR301

Ⓐ—Ⓑ, Ⓓ—Ⓔ : Posición de "estéreo" OFF
Ⓑ—Ⓓ : Posición de "estéreo" ON
Ⓒ : Punto de ajuste de circuito piloto

CONDICION DE GENERADOR DE SEÑALES DE FM
Modulación 10%
Frecuencia de modulación ..... Pilot (19 kHz)
Nivel de salida ..... 66 dB



MODULADOR ESTEREO
Señal piloto a ON ..... 19 Hz
Modalidad de salida ..... Izquierdo+Derecho

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